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PIPE MILLS INSTALL NEW MANAGEMENT PROGRAM

By M. L. JACOB

IT is a recognized fact that iron and steel manufacturers have pleaded "not guilty" when approached upon industrial and management engineering. Their belief that "it won't work in our business" is gradually changing, with the result that constructive work is now being done in and for those industries.

The Page Hersey Tubes, Ltd., manufacturer of iron and steel pipe and casings, operating plants at Welland and Guelph, Ont., and Cohoes, N. Y., with main offices in Toronto, has enjoyed a successful growth and, to insure a steady future expansion, has turned to management engineering.

This company, at the request of THE IRON AGE, consented to permit the writer to present a general

résumé of just what was done in its plants to increase operating efficiency.

Survey and Installation Made at Cohoes

The program was started by the president of the company when he authorized the works manager at Cohoes to call in a management engineer to determine what could be done in that plant. The writer was engaged to make a detailed survey of the plant, which covered equipment, plant layout, operations, methods, general routine, man-power, supervision, costs and distribution.

This survey, presented to the management in about six weeks' time, pointed out that operations could be carried out much more profitably if cer-

▲ ▲ Rolling narrow skelp at Page Hersey plant. ▲ ▲



1903

THE Page Hersey plan established costs of making pipe on a 100 ft. per size basis. The older practice is to keep a "100 lb. of product produced cost," which, however, makes it impossible to arrive at individual size costs except by general estimate.

Wage incentives for workmen and bonuses for supervisory staff were based on standard production of 100-ft. lengths per size.

tain changes were made in the plant. The suggestions, in part, were a revision of the methods of processing pipe, a change in the manner of handling raw material and finished product, a redistribution of man-power in the plant and other specific items. The complete schedule of existing costs, compared with those that would be in effect after the changes were made, briefly tells the story.

The installation of new and improved equipment made it possible substantially to reduce the number of employees in that plant. A wage incentive plan for the workers, primarily designed for this type of plant, permitted further reductions in man-power and resulted in an average increase in production of more than 15 per cent. To insure the continuance of the program as installed, all foremen and superintendents were placed upon a performance bonus basis, the details of which appear later in this article. The success of any installation of this type depends somewhat upon maintaining uniform mill operations. This was assured by the revised method of obtaining costs, which permitted the establishing of costs by sizes per 100 ft. of pipe produced and

enabled the company to bid successfully against competitors for business.

Survey of Welland Plant

Following the success of this installation at the Cohoes plant, the writer was again engaged to conduct a similar survey of the company's main plant at Welland. The problems encountered here were entirely different from those found at Cohoes. The Welland plant was using very efficient methods in its manufacturing processes, equipment was of a modern type, the plant was operating at good capacity and sales were in excess of production.

The survey, however, brought out the fact that production could be stepped up to meet sales requirements without installing additional equipment. It further disclosed that, by introducing the same wage incentive plan for the workers that was installed at the Cohoes plant and the performance bonus plan for the supervisory staff, substantial reductions could be made in the labor force at Welland.

In addition, it was brought to the attention of the management that export and domestic business could be materially increased by establishing costs on a per size per 100 ft. of product basis, which would enable the company successfully to outbid competitors. Establishing costs on this basis is essential, as the product is sold on a 100 ft. per size basis. The customary practice in mills of this type is to keep a "100 lb. of product produced cost." This, of course, makes it impossible to arrive at individual size costs in any way except a general estimate.

Preparatory Work Necessary

Upon beginning the installation all foremen and superintendents were called together for a general meeting, at which time the complete details were presented to them. The benefits that would accrue to the supervisory staff were pointed out and what the management expected of them was mentioned. The staff was much interested and asked numerous

SCHEDULE NO. 1

Time Study Observation Sheet

Page Hersey Tubes, Ltd., Welland Plant

Department: Butt weld Finishing				Date: 12/17/29				Operation: Thread Size H-In. Reg. Black Pipe								
Operations		Cont.		Ind.		Cont.		Ind.		Cont.		Ind.		Total	Average	Allowed Min.
Pick up and position pipe)																
in threading machine)		0.06		0.07		0.05		0.05		0.06		0.29		0.058	0.06	
Thread one end		0.21	0.15	0.22	0.15	0.20	0.15	0.25	0.20	0.20	0.14	0.79	0.158	0.15		
Remove from machine		0.29	0.08	0.30	0.08	0.28	0.08	0.32	0.07	0.27	0.07	0.38	0.076	0.08		
Machine No. 223		Type Landis lathe				Drive Motor				Total actual time				0.290		
Operators No. 416-351		Observations made 64				Cutting speed O.K.				Mach. allowance 10%				0.029		
Group No. BF 3		No. of operators studied 6				Cutting feed O.K.				Personal allowance 5%				0.014		
Men in group 2										Total allowed time				0.333		
Standard time per man 0.0055 hr.		Production per hour 180 lengths								Old piece price \$0.29/100						
Standard time per group 0.0110 hr		Base rates \$0.35 per hour								Rate made effective 12/18/29						
Remarks		Operator working—average								Approved by JSW						

Bonus starts at 125 lengths (Std. time 0.80/100 lengths)

Bonus \$0.28/100 over 125 lengths per hour

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pointed questions concerning fundamental details, which were promptly answered.

It is of importance to note in passing that in this installation three tough problems had to be successfully solved: 1. The plant was operating on a piece work and tonnage plan which seemed satisfactory. 2. The plant had been operating successfully on the plan in use for more than 15 years without any material changes being made. 3. The rank and file of the workers were of foreign birth and were banded together in a sort of a local union.

Needless to state, careful handling was necessary to put the installation over without creating any friction. The full cooperation of the management helped greatly in making this difficult task simpler.

In the illustrations that are to follow figures applicable to both plants have been chosen. To protect the interest of the writer's client, actual sizes of pipe have been supplanted by letters. These have been arbitrarily chosen so as not to disclose vital information, but still serve the purpose of the writer in presenting the details of the plan.

The actual installation started when the writer began to take time studies in the butt welding department. Considerable time was spent in checking the production of the various sizes on the several furnaces, before preparing any figures. The results of the actual time studies (a copy is shown for the butt weld finishing department, schedule No. 1) were compared with the previous records, and

the production standards were set for the various sizes of pipe made in the butt welding department. (See schedule No. 2).

Following the setting of the standards, which were in terms of production per hour, they were converted to hours per length, as shown in schedule No. 2. At this time a revised set of hourly rates for the various jobs on the furnace was established which the management approved.

The information contained in schedule No. 2 was not presented to the men in this form, as it had a tendency to confuse them. Schedule No. 3, showing the actual bonuses that they would earn for their production on the different sizes was prepared and given to the men. They had no difficulty in understanding this chart, as all workers are interested in their day's pay, and not in the details of how that pay is to be figured.

Before the bonus rates were put into effect in the butt welding department a set of standards was prepared for the foremen and superintendents, which represented the time allowed in man-hours completely to process a length of pipe in that department. Schedule No. 4 shows those figures.

Operators Work on New Incentive Plan

The butt welding department was now ready to start work on the new incentive plan. Production records continued to come to the payroll department as before. The paymaster applied the proper standard time against each pipe size, made the prop-

SCHEDULE NO. 2

Production Standards Set for the Butt welding Department

Pipe Size	Minimum Production per Hour, Lengths	Standard Time per Length, Hours	Pipe Size	Minimum Production per Hour, Lengths	Standard Time per Length, Hours
A	410	0.0024	I	240	0.0042
B	316	0.0032	J	157	0.0064
C	394	0.0026	K	189	0.0053
D	287	0.0035	L	126	0.0079
E	344	0.0028	M	124	0.0081
F	206	0.0049	N	101	0.0099
G	287	0.0035	O	88	0.0114
H	200	0.0050	P	68	0.0146

er extensions, and the total represented the standard hours or the work accomplished by the group on that shift. The standard hours, when multiplied by the proper hourly rate for the job, resulted in the day's pay for the worker. A typical run for a shift follows, and is calculated in detail to permit the reader to follow the method.

Sizes of Pipe Produced	Number of Good Lengths	Standard Time per Length	Total Standard Time
E	1500	0.0028	4.2
H	800	0.0047	3.8
K	750	0.0053	4.0
Total standard hours			12.0

Briefly speaking, 12 hr. of work was done in a regular 10-hr. shift and the earnings of the various workers for that shift follow:

Operator	Hourly Rate	Base Earnings	Bonus Earned	Total Day's Pay
Welder	\$0.75	\$7.50	\$1.50	\$9.00
Picker	0.60	6.00	1.20	7.20
Shearer	0.55	5.50	1.10	6.70
Charger	0.50	5.00	1.00	6.00
Furnace hands	0.35	3.50	0.70	4.20

In the event that the total standard hours for the shift did not total 10 hr., representing the period of the shift, the various operators were paid only their base earnings, and no bonus. In instances where the payroll department was not interested in the bonuses earned, and only in the day's pay, only one calculation was necessary. The standard hours times the hourly rate on the job, in the case of the welder above, is $12 \times 0.75 = \$9$, the day's pay.

Supervisory Bonuses

A set of standards, which represented the total man-hours required to produce one length of good pipe at the furnace, was used as the basis for determining the foreman's and superintendent's bonus. This, for the butt welding department, follows, in Schedule No. 4.

To illustrate how the foreman's bonus was applied, three typical runs were taken at random from the production records. The actual hours were those reported by the timekeeper for that shift. The standard hours were obtained by applying the prop-

er standard time against each size, as listed in schedule No. 4.

Pipe Size	Lengths Produced	Standard Time per Length	Total Standard Time
A	2,500	0.0757	190
D	1,000	0.1080	108
I	237	0.1225	29
Total standard hours			327
Actual hours reported			300
Performance for the day			$\frac{327}{300} = 109$ per cent
SECOND DAY			
C	4,340	0.0788	342
Actual hours reported			290
Performance for the day			$\frac{342}{290} = 118$ per cent
THIRD DAY			
A	3,060	0.0757	232
E	1,665	0.0901	150
Total standard hours			382
Actual hours reported			305
Performance for the day			$\frac{382}{305} = 125$ per cent

The foreman was informed of his performance each day and also his performance to date for the month. A bonus was paid for every 1 per cent his performance was above 100 per cent, based upon the cumulative average for the period of one month. That cumulative figure was arrived at through maintaining a chart somewhat as follows:

Date	Stand-ard Hours	Actual Hours	Performance for Day	Total Stand-ard Hours	Total Actual Hours	Performance to Date for Month of January
First	327	300	109 per cent	327	300	109 per cent
Second	342	290	118 per cent	669	590	113 per cent
Third	382	305	125 per cent	1,051	895	119 per cent

The final performance figure to date for the month at the end of the month represents the cumulative average performance for that month. He was paid a bonus for his percentage over 100 per cent, i.e., if 119 per cent shown above is the last day of the month's figure, 19 per cent is the bonus due the foreman for that month. The actual amount of the bonus was calculated by taking 19 per cent of his month's salary.

Superintendents were paid a bonus based upon the cumulative average performance of the foremen under their supervision, the total standard and actual hours of each department being used to ar-

SCHEDULE NO. 3

Minimum Hourly Production and Bonuses Paid (Butt welding Department)

Pipe Size	Bonus Starts at	Bonus Paid for Every 100 Lengths Over Base				
		Welder	Picker	Shearmen	Chargers	Furnace Hands
A	410	\$0.180	\$0.144	\$0.132	\$0.120	\$0.084
B	316	0.240	0.191	0.176	0.160	0.112
C	394	0.195	0.156	0.143	0.130	0.091
D	287	0.262	0.210	0.193	0.175	0.123
E	344	0.210	0.168	0.154	0.140	0.098
F	206	0.368	0.294	0.270	0.245	0.172
G	287	0.262	0.210	0.192	0.175	0.122
H	200	0.375	0.300	0.275	0.250	0.175
I	240	0.315	0.252	0.231	0.210	0.147
J	157	0.480	0.384	0.352	0.320	0.224
K	189	0.397	0.318	0.291	0.265	0.185
L	126	0.593	0.473	0.435	0.395	0.276
M	124	0.607	0.485	0.445	0.405	0.283
N	101	0.741	0.594	0.544	0.495	0.346
O	88	0.855	0.685	0.627	0.570	0.400
P	68	1.095	0.877	0.804	0.731	0.512

rive at the superintendent's performance. The amount of the bonus is calculated the same as that for the foreman, a percentage of the month's salary equal to the percentage above 100 per cent.

Establishing Costs by Sizes

Continuing to use the butt welding department as an illustration, the method of obtaining costs by sizes per 100 ft. of pipe produced will be shown. In the general scheme of establishing costs by sizes it is important that all of the direct and overhead expenses for the plant be charged into operating departments. To insure this a distribution of all expenses, not directly chargeable against any one department, such as overhead and general and administrative expenses, was made and the proper amounts allocated to the various operating departments, on a prorated basis. By doing this all of the expenses incidental to the manufacture of pipe found their way into the costs. To simplify the procedure sales expenses, cash discounts and other normal sales disbursements were not included in the manufacturing costs, but were added to the final costs on a direct percentage of cost basis.

One of the several butt welded furnaces was used in the following illustration. The figures are not those as of record. The method of handling the figures is as used in actual practice. A short period was chosen and the expenses for the furnace for that period are as follow:

Butt Weld Furnace Expenses for the Period	
Items	Amount
Producing labor	\$52,372.40
Gas and supplies	25,463.50
Machinery repairs	4,086.50
Heat, light and power	5,161.00
Water	195.00
Skelp handling and yard expense	2,210.70
Works expense	1,296.00
General and administrative expense	5,530.70
Total	\$106,315.80

The production of the furnace for this period is shown in schedule No. 5. The first step in arriving at costs by sizes is the determination of the skelp yield and the net material cost per size per 100 ft. of good pipe produced at the furnace. The method is simple. The actual weight and value of the skelp charged into the furnace are matters of record. From the gross charge the proper deductions are made for losses, seconds and scrap, both as to weight and value, resulting in the net weight and value of good pipe produced. The total hundred feet of pipe welded, when divided into the total value of the net

SCHEDULE NO. 4

Standard Time per Length for Foremen's Bonuses

Pipe Size	Total Standard Time per Length	Pipe Size	Total Standard Time per Length
A	0.0757	I	0.1225
B	0.0984	J	0.1970
C	0.0788	K	0.1640
D	0.1080	L	0.2530
E	0.0901	M	0.2490
F	0.1510	N	0.3062
G	0.1080	O	0.3060
H	0.1550	P	0.3880

skelp, which in reality is the value of plain-end pipe at the furnace, is the net material cost per 100 ft. per size. To this is added the welding cost, as calculated in schedule No. 5, and the finishing cost, to arrive at a total manufacturing cost per 100 ft. of pipe per size.

Attention is called to the fact that the standard time per length, used in schedule No. 5, is the same standard time that was used in calculating the foreman's bonus. In calculating the total welding cost per size, a standard hour cost is first obtained by dividing the total expenses for the period, \$106,315.80, by the total standard hours for the period, 64,428, which amounts to \$1.65. This standard hour cost is multiplied by the standard hours for each size of pipe to arrive at the welding cost per size. The welding cost per 100 ft. per size is obtained by dividing the welding cost by the hundred feet welded.

Procedure Repeated in All Departments

The procedure as described for the butt welding department was repeated in all of the other production departments. They included the rolling mill, butt weld finishing, lap welding, lap weld finishing, galvanizing, coupling forge, coupling finishing and nipple departments. In each department standards were set for the operators as shown earlier in this paper. In some instances standards were set for individual operators, as group standards would not have given the proper incentive, which is of prime importance in an installation of this kind.

Standards for foremen, representing the total man-hour time to process pipe in that department, (Concluded on page 1977)

SCHEDULE NO. 5

Calculating Welding Cost per Size per 100 Ft. of Pipe

Pipe Size	Lengths Produced	Standard Time per Length	Standard Hours	Total Welding Cost	Hundred Feet Welded	Welding Cost per 100 Ft.
A	380,750	0.0757	28,801	\$47,600.18	75,550	\$0.631
B	12,508	0.0984	1,230	2,032.05	2,416	0.844
C	140,609	0.0788	11,062	18,356.20	27,185	0.676
D	10,502	0.1080	1,137	1,871.16	2,021	0.926
E	110,023	0.0901	9,915	16,350.09	21,213	0.771
F	25,430	0.1510	3,840	6,341.75	4,820	1.315
G	78,147	0.1080	8,443	13,764.37	15,106	0.910
Totals			64,428	\$106,315.80		



Spur gear hobs are checked on a specially-designed lead checking fixture. ▲ ▲ ▲

Cutting Tools Manufactured In Specially Designed Plant

By BURNHAM FINNEY

THAT modernizing of plant pays dividends is the conclusion reached by the Michigan Tool Co., Detroit, which recently moved into a new one-story factory specially designed for the manufacture of cutting tools. By constructing this home, which is equipped with new high-production machine tools and other machinery specially built for its operations, the company has reduced operating costs substantially and is in a better position than heretofore to make all kinds of special tools on short notice.

Rigid inspection of materials in process following each operation is a feature. In most cases measuring instruments designed and built by the company are used to check the accuracy of the work. Likewise, the machinery and tools in the grinding room for grinding hobs and cutters, as well as those in another grinding division for grinding gear shaper cutters, gear burnishers, internal gear broaches and gages, were developed by the company.

Cutters and hobs are form relieved to give cutting clearances in the back-off department, which numbers among its equipment 48 special machines of the company's own design and manufacture. Here the range of work is from the smallest size up to 12 in. in diameter and 14 in. in length, the latter representing the largest size now on the market.

Hob Manufacture Illustrates Precision Methods

The procedure in making a 3 x 3-in. hob is characteristic of the work done by the company, and

illustrates the precision with which it manufactures its products. The hob is made from a high-speed steel forging, having sufficient stock for machining purposes. After inspection for size, surface cracks and seams, it goes to a turret lathe for a chucking operation. Here a 1 15/64-in. hole is drilled and recessed. The hole is then broached on a broaching machine and the forging inspected internally. The next operation is turning the hob to proper length and outside diameter on a lathe specially tooled for all these operations simultaneously.

Passing to the milling department, where the gashes are milled and the blank is keywayed, it then goes to the inspection room for inspection; a record is made of its location on the follow-up sheet, and it passes to the back-off department where the thread is rough milled. In order to remove strains and stress in the steel, the hob is next placed in a normalizing oven. As soon as it is thoroughly normalized, the hole is rebroached and the ends of the blank refaced. The hob is then put on a back-off machine to have the form and relief work done.

If the hob is to be an unground form hob, the teeth are then finished to size. If it is to be a ground form hob, there is enough stock left on the teeth for grinding the form all over after hardening. After the hardening operation, it is again checked for hardness, which, except for special jobs, is held to approximately 63 Rockwell reading. It is then passed to the general grinding department, where the hole is ground true to the form produced on the

back-off machine. The ends are faced true with the hole, which is held to 0.0002 in.

Hob Grinder Incorporates Sine Bar

The hob is again inspected and sent to the hob grinding department, the equipment of which includes specially designed and built machines for grinding the form of the hob. Some years have been spent in developing this grinding machine. The old method of grinding hobs was to use a master lead-screw. In today's requirements, where the lead must be held to very close limits, it has been found impossible to produce lead-screws accurate enough to produce a hob to the limits required.

Michigan ground hobs are made to a limit of 0.0002 in. in spacing from tooth to tooth. The lead is checked on a Michigan lead checking fixture, the limits on ground form hobs being 0.0005 in. in one turn and 0.0002 in. from tooth to tooth, runout of outside diameter 0.0005 in., and runout of hubs for indicating purposes on the machine 0.0002 in. With the new Michigan hob grinding machine, it is not necessary to use a lead-screw. This machine is built with a sine bar feature, whereby a change in the angle of the sine bar produces a lead which is as perfect as the sine bar itself. As the sine bar is made round, it can therefore be easily made and checked for its accuracy. The range of this machine is from zero to 2.6 in.

If the tool is a spline-shaft hob, a sample piece is cut by it and shipped with the hob. Spur gear hobs are checked to close limits on a specially-designed lead checking fixture and contour checking fixture.

Special Instrument Checks Involute Profile

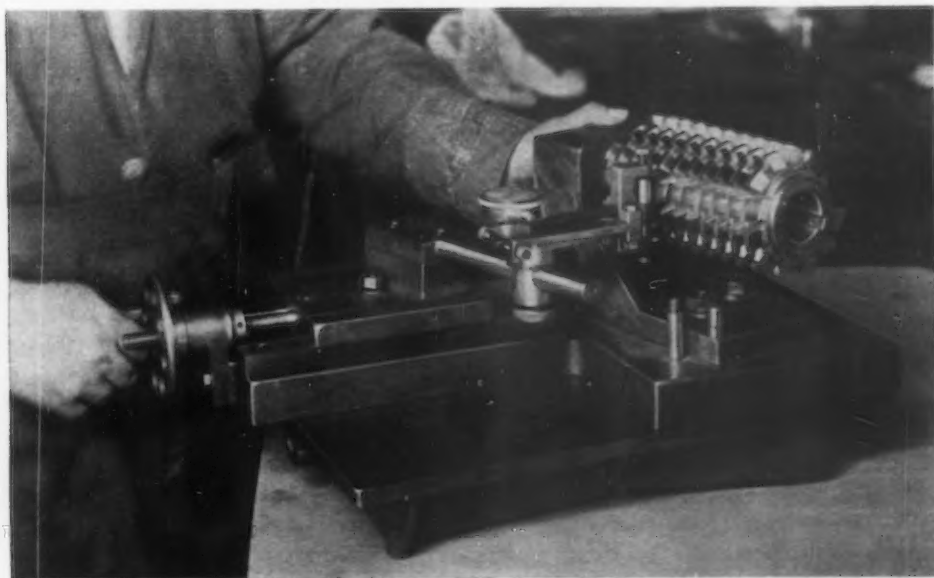
In the grinding department there are many special fixtures for checking gear shaper cutters, gear burnishers, internal broaches, cutters and gages. A special instrument has been set up for determining the accuracy of the involute profile on any of these items. It consists of a base-plate and disk of the same diameter, less thickness of tape, as the base circle of the gear cutter to be inspected. A plug or bushing to locate the gear or cutter and a straight-

THE Michigan Tool Co., Detroit, has substantially reduced operating costs by constructing a one-story plant specially designed for the manufacture of cutting tools and equipped with high-production machine tools and other machinery built for its operations. The story of how it has geared production to make cutting tools on short notice is told in this article.

edge are held in contact with the base circle disk by means of a steel tape 0.010 in. thick. On the straight-edge is mounted a five-to-one lever, the short arm of which is in contact with the tooth form, and the long arm with the plunger of the dial indicator. The lever multiplies the reading so that each division on the indicator is equivalent to 2/10-in. As the straight-edge is rolled about the base circle, the short arm follows the tooth form of the gear. If the tooth is true, the pointer of the indicator remains stationary. If there are errors, the pointer shows the amount.

Among other products the company makes tools to cut gears for a complete transmission, roughing and finishing, using both the hobbing and Fellows processes. Approximately 95 per cent of its output is manufactured from forged high-speed tool steel.

In order that parts may be properly heat treated, the plant has a special department for this purpose. With the exception of ground-form tools, all tools are hardened in a bath solution furnace to make sure that no distortion of the steel will occur during the hardening process. In the hardening department are gas-fired carburizing furnaces, Homo electric drawing furnaces, Surface Combustion gas-fired hardening furnaces, and bath electrically-heated hardening furnaces. All furnaces, both gas and electric, are controlled automatically.



CONTOUR checking fixture for checking spur gear hobs. Ground hobs are made to a limit of 0.0002 in. in tooth spacing.

Changing modern manufacturing conditions require flexibility of operations, including receiving, storing and shipping of materials. Equipment and departments must be arranged so they can be moved quickly if production changes suddenly become desirable. On the other hand, accurate work is sometimes slow work, but the company wanted to give its men the best possible facilities for speed and excellence. These factors were carefully considered in designing the new one-story plant.

Plant Arranged for Flexibility

The manufacturing part of the building is not seen from the street, being hidden by the office section, which is higher. It is constructed of steel and brick with large factory-type windows placed continuously. It covers an area of 190 x 260 ft. Near the center of the shop is a glass-inclosed office for

ruined when dropped on wood. Above the floor the clearance is 13 ft. in low aisles and 32 ft. in high aisles. Plumbing and steam pipes, water mains and wires are placed above the clearance line. Water mains are properly valved in order that any section may be turned off for repairs without affecting other sections.

Daylight and ventilation are provided by two parallel monitors 50 ft. wide, extending the full length of the shop. The windows are 7 ft. high and set in the faces of the monitors projecting above the roof. The wide monitor and high sash distribute light evenly over a large floor area. The ventilating units in the sash are mechanically operated from the floor.

The roof deck is of steel. Because of the fact that materials in the shop are almost all incombustible,



THE form of hobs is ground on new hob grinding machine designed and built by the company. The machine incorporates a sine bar, a change in the angle of which produces the desired lead accurately.

the shop superintendent, who can see from it every worker and machine. By keeping himself informed of the progress of the work, he is more efficient in directing it.

All special tools, such as milling cutters, are stored in the department where they are used within convenient reach of machine operators. Standard tools are kept in a centrally-located caged crib. Lockers and toilet rooms are on a mezzanine floor, their positions having been selected with respect to the number of workers near by. Workmen going up or down the mezzanine steps are in full view of the superintendent and foreman. The cost of placing these rooms above the main floor is slightly greater than building them in the old-style way, but the effect on the men is excellent. In the long run, time and money are saved by this arrangement, especially as it does not interfere with work on the main floor.

Wood Floors Reduce Spoilage

The floor of the shop has a concrete base, reinforced with steel and finished with 2-in. wide maple flooring laid on a wood sub-flooring. The wood floor has cut down spoilage of parts by dropping, because fine tempered and accurately finished tools are not

tible, the insurance companies decided that installation of a sprinkling system was not justified.

For the size of the building the heating system seems small, but is ample in view of the insulation of the steel roof with a half-inch layer of Celotex, which reduces loss of heat by radiation. The saving in the purchase of the smaller heating plant paid the insulation expense. In addition, lessened fuel consumption each year will bring still further economies.

Blower Units Used for Heating and Air Circulation

The steel stoker-fired boiler enables the company to burn low-grade fuel. A brick stack, installed due to saving in maintenance costs, is of sufficient capacity to handle another boiler if plant expansion becomes desirable. The heating plant provides cast-iron radiation for the offices and electrically-operated blower units for the factory, and easily maintains a uniform temperature of 70 deg. Fahr. over the whole factory. Each floor unit is thermostatically controlled and the temperature maintained within 2 deg. variation. In summer the steam is shut off and the blower-unit fans run, giving a good circulation of air.



▲ ▲ ▲ **Hardening department. All tools are hardened in a bath solution furnace to make sure that no distortion of steel occurs during hardening process.** ▲ ▲ ▲

In the boiler room the steam pipes are insulated. In the factory they are overhead and left exposed to give heat radiation. The heating system's condensation return lines are underground, and are kept clear by means of an automatic condensation pump, which maintains operation of the system under a vacuum. The company buys power from the Detroit Edison Co.

Set apart from the main shop, the heat-treating department has metal ventilators of the louvre type, each 6 sq. ft. in size, in the sill walls under the windows. A full sweep of air through the room can be obtained quickly, smoke and fumes being carried off through rotating ventilators in the roof.

The switchboard and transmission room is constructed of masonry separated from the shop by fire

walls. The switch house is equipped complete with circuit breakers, no fuses being used. The power wiring is of the open-mill type, which is flexible and economical if machines are to be moved from one location to another. Electric lighting in the factory is supplied by ceiling fixtures with enameled iron reflectors.

Numerous doors in the factory facilitate handling of goods. In the receiving and shipping department trucks can be driven in on the floor level. The floor is concrete with drains for water and melting snow. A monorail is used for loading and unloading heavy materials. To conserve as much space as possible, raw materials are stored in the receiving department in a vertical position.

(Concluded on page 1978)

▲ ▲ ▲ **Part of shop, showing good lighting and comfortable working conditions for men.** ▲ ▲ ▲





Precision in Shop Methods

... QUALITY PRODUCTS REQUIRE ACCURACY NOT ALONE ON INDIVIDUAL OPERATIONS BUT FROM THE BEGINNING TO THE END OF THE MANUFACTURING CYCLE

By C. A. ZIEBARTH

Secretary and General Superintendent,
Bell & Howell Co., Chicago

QUANTITY, extreme accuracy, and quantity production at selling prices that will not stifle the market are the imposing demands that must be met by manufacturers of moving picture cameras and projectors. To illustrate the exacting requirements in these products, which are in growing demand by amateur enthusiasts, and which also are finding important industrial and commercial uses, it may be mentioned that, when a camera starting button is pressed, a shaft $2\frac{1}{2}$ in. long, 0.0938 in. in diameter, finished with less than half a thousandth tolerance, rotates at 30,000 r.p.m. When the button is released, rotation must stop almost instantly. This must be repeated not once but thousands of times.

Twenty-three years ago, Bell & Howell Co., Chicago, entered the field of professional moving picture camera manufacture. This sort of equipment is of extreme precision, rugged, either hand-cranked or motor-driven, and securely mounted when in use. The cost of such a camera is measured by thousands of dollars. In contrast, the amateur movie maker wants not only dependability, which means quality and precision, but also light weight and automatic operation, because the camera is used mostly without support.

Moreover, the retail price must be measured by a few hundreds of dollars.

These demands impose on the manufacturer such conditions as press operations on small parts which must be assembled in quantity without fitting; finished turret lathe and automatic screw machine work on which tolerances are plus and minus half a thousandth and less; grinding operations of such accuracy that the machine must be kept at normal temperature to be used satisfactorily. Also, some parts are assembled and hand-lapped and no tolerances are allowed.

A typical example of punch press work at the Bell & Howell plant is offered by the production of the mechanism case for the design 75 Filmo camera. The case is made from 0.125 in. \pm 0.002 in. thick sheet aluminum, $11\frac{5}{8}$ in. wide and 72 in. long. The sequence of the main punch press operation for shaping the case is as follows: blank and draw, trim, first backset, push stock for sharp corner, final backset, reset bottom and open sides. These operations form a case 3.906 in. wide, 8.656 in. long and 1.649 in. high. There is a recess on the sides and bottom (exterior) to allow for assembling a fabricoid covering between the shoulders of the recess. There are two recesses inside, one formed to allow for a coat of flat black lacquer on two-thirds of the side wall and the other formed for the camera cover. The outstanding feature other than the tolerances is that both of the outside edges have a $\frac{5}{64}$ in. radius and the inside corner radius between the bottom and the sides is only $\frac{1}{32}$ in. Ninety per cent of the dimensions on this case are held to total tolerances ranging from 0.0005 in. to 0.004 in.

High Speed Shaft Held to Close Limits

The governor worm shaft, which in the design 70 Filmo camera rotates at 30,000 r.p.m., offers an example of precision production of small parts on an automatic screw machine. This part is made from $\frac{1}{8}$ -in. diameter cold-drawn stock and is finished, ex-



This camera case, pressed from sheet aluminum, is held to tolerances ranging from 0.0005 in. to 0.004 in.

Contributes to Success

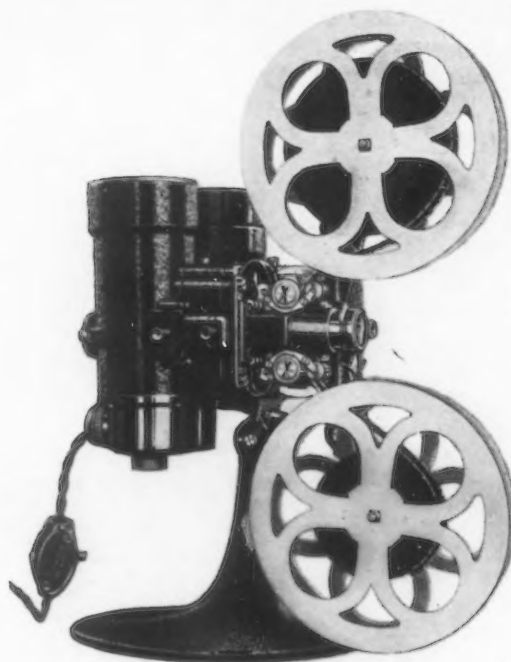
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I FIRMLY believe that in manufacturing a quality product relative precision methods occupy a position of importance that cannot be overestimated. In our own products manufacturing is measured in a large degree by tenths of thousandths of an inch. To the emphasis which we have consistently placed upon such precision I attribute much of the success of our product.—C. A. Ziebarth.

▼ ▼ ▼

cept for the two bearing ends, in a screw machine. The governor spring bearing on this shaft is $1\frac{1}{2}$ in. long. This surface, after turning, is roller-burnished to 0.0938 in. with a tolerance of -0.0005 in. The two end bearings are finished on a bench lathe fitted with a turret head to form and burnish them to a diameter of 0.0645 in., -0.0005 in., after which the entire shaft is hardened and polished.

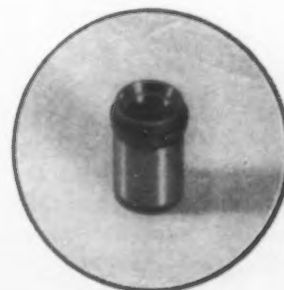
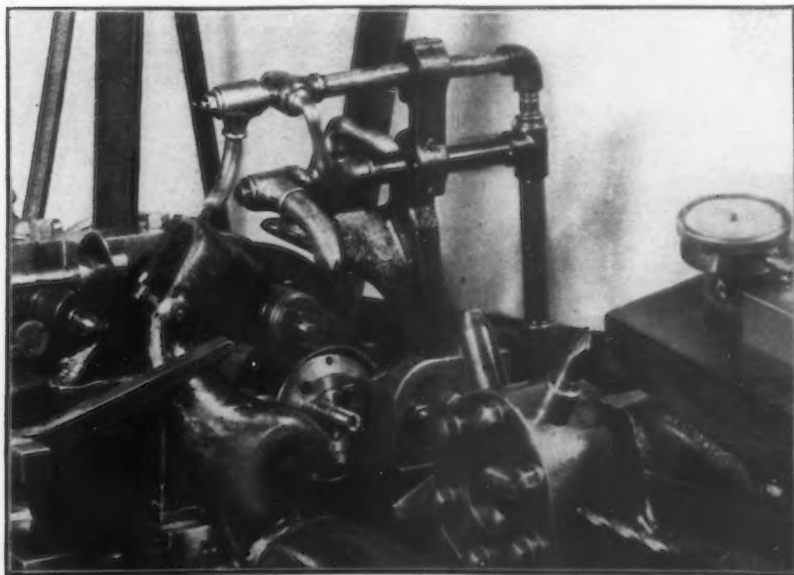
Production on the spindle bearing has been doubled through the application of a transfer arm and fixture to the screw machine. Formerly the unfinished end was countersunk in a drill press. The standard operations on the screw machine are center, drill, ream, countersink and cut-off. The transfer arm then



takes the part to the fixture, where the cut-off end is countersunk and the final operation of cutting a slot is performed.

Another interesting operation problem has been solved in the making of winding key hubs. These are made from 1-3/16-in. cold-drawn bars in an automatic screw machine. The first operation is to rough hollow mill and then finish hollow mill to 0.559 in., with a tolerance of -0.002 in. The outside diameter is turned to 0.904 in., $+0.004$ in. The hub is then drilled, formed to the back shoulder, rough drilled to the shoulder, reamed to 0.3755 in., $+0.001$ in., then fed out to a stop, and while it is being cut off the screw machine finishes forming the front sleeve. The hubs are then placed in a magazine from which they are fed to be drilled and reamed from the opposite end. This part is reamed from opposite ends to assure that the two drilling operations are on center preparatory to broaching for the square winding key.

Milling machines also play an important part in production of precision parts. The heart-shaped cam



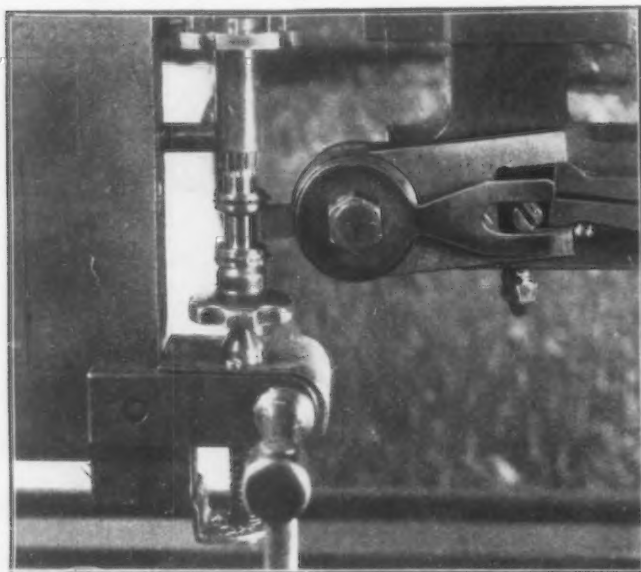
APPPLICATION of a transfer arm and fixture to a screw machine has doubled the output of spindle bearings.

This spindle bearing (above) is now made on one machine.

which provides the intermittent movement of the film is cut on a miller within limits of ± 0.001 in. This cam is a high speed part which, when in operation in the camera, completes a cycle in $1/64$ sec. After machining the cam is ground to a snap gage limit of 0.0005 in., total, for all ways around the cam, and the same tolerance for the cam throw and concentricity, and finally the hole is lapped to 0.0002 in. total tolerance.

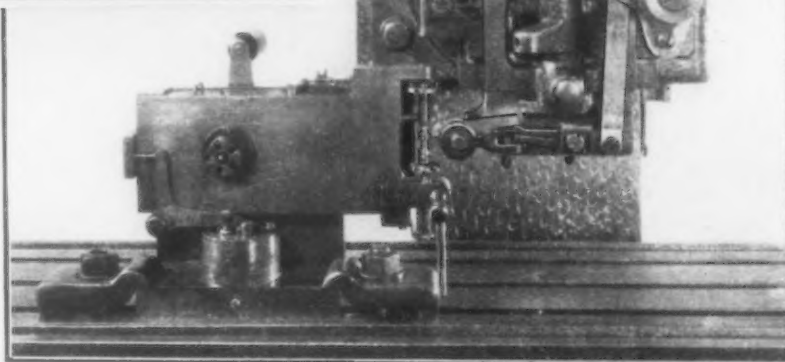
Indicators Are Applied to Milling Machines

Many millers in this shop have been provided with exceptionally fine feeds, and in addition indicators have been attached so that operators feed to indica-



THIS feed-in index fixture (at right) is equipped with an oil dash-pot control with indicator, which shows when correct depth of tooth has been reached.

Sprocket tooth forming (above) in milling machine using a shaving attachment.



tor stops. These indicators are calibrated to read in thousandths of an inch and thereby the operators read results rather than feel for them.

The eight-tooth sprocket for the projector and the five-tooth sprocket for the camera are made of brass and blanked to size (tolerances ± 0.001 in.) in an automatic screw machine. Teeth are formed on millers. Dimensions of the teeth are: radius 0.100 in., ± 0.001 in.; width and depth 0.040 in., ± 0.001 in.; length 0.042 in., ± 0.001 in., and 0.001 in. is the maximum eccentric tolerance on the root diameter of the sprocket. The cutters are ground to masters and then lapped to finished dimensions.

The miller on which this work is performed is fitted with a feed-in index fixture equipped with an oil dash-pot control with indicator which shows when the correct depth of cut has been reached.

Not only are some dimensions of a given part held to exact measurements, but in some cases parts must be assembled and the accumulative error be within a total limit of 0.0001 in. An example of work of this kind is afforded by punches which are used for perforating film. The completed punch consists of four U-shaped parts, the legs of which are the punches. The width of the punch must be exactly 1.220 in. To attain this precision the punch is machine lapped to 1.2204 in. ± 0.0001 in. and then hand-lapped to 1.220 in., ± 0 . The four segments when assembled have a total tolerance over all of 0.0001 in. Each tooth, or punch, must measure 0.078 in. by 0.110 in., and the diameter or diagonal must measure 0.1199 in., ± 0.0001 in. Three sides of the four corners of each punch are ground by cam control on a bench lathe. Best results are obtained only when normal temperature ranging from 65 to 70 deg. Fahr. is maintained.

Accurate stamping, drilling, reaming and grinding play an important part in making the shuttle, which is actuated by the heart-shaped cam previously mentioned. The shuttle is blanked and formed from special strip steel of 19 gage with a ± 0.001 in. allowed on the stock. The cam bears

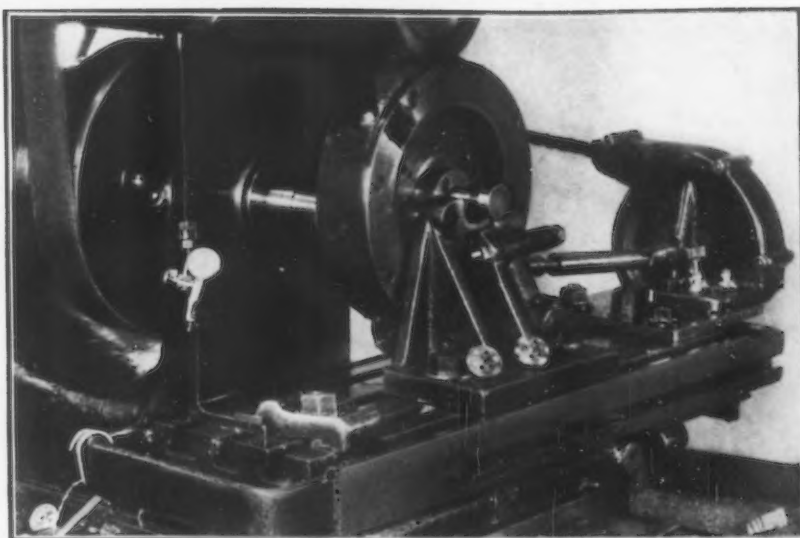
against slide surfaces which are on the inner edges of the sides of the shuttle. The distance between these two slides must be held to 0.50035 in., ± 0.00015 in. These surfaces are ground on a machine especially designed and built by the Bell & Howell Co. These machines are of especially heavy construction and the table, which can be adjusted up or down to compensate for the size of the grinding wheel, is graduated on the rim. The top of the table is highly finished, so that the fixture which holds the shuttle may be freely moved over its surface.

This fixture is in effect a double-ended device, so that after one slide surface has been ground the fixture is turned end for end and the other slide is ground. The fixture, which holds a shuttle rigidly at four points, is placed on the grinder table and pressed against a mechanically operated arm which keeps the



HEART-SHAPED shuttle cam milling operation, showing how the machine is set to an indicator gage for close limit milling. (at right)

Milling machine limits on this shuttle cam are 0.001 in. (above)



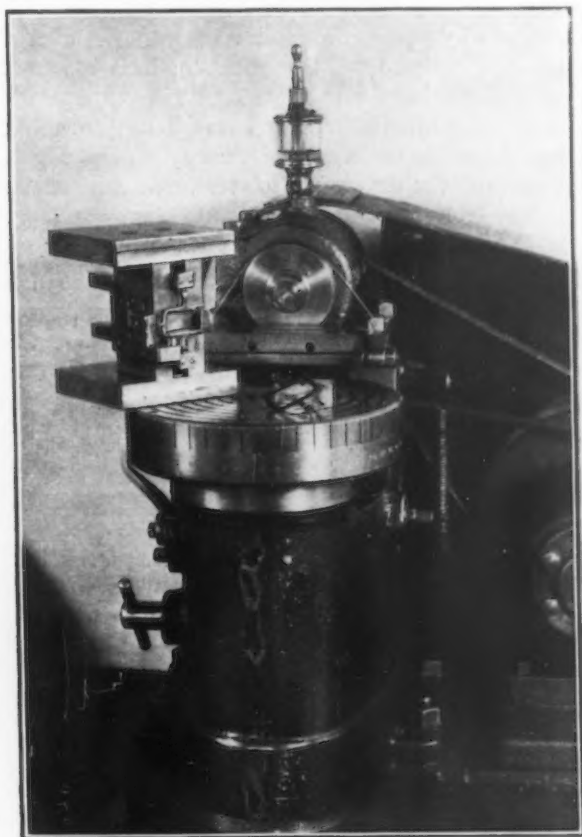
fixture in motion so that wear will be evenly distributed on the grinding wheel.

Lapping Operation Brings Holes in Line

Holes in the lugs on the shuttle are reamed to 0.1237 in., -0.0003 in., and lapped in line after har-

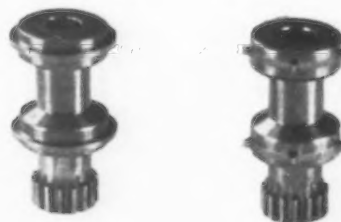
dening to 0.1251 in., $+0.0002$ in. The lapping of these holes must be extremely accurate, because they become location points for important dimensions, and also they are used for locating the parts in fixtures used for exacting grinding operations.

Throughout this shop are skilled workmen, thoroughly maintained equipment, and the desire to produce a quality product. Parts must be made separately and in quantity, as necessity dictates, and interchangeability of parts manufactured is the law.



THE inner slide surfaces of the shuttle are ground on this special machine.

This shuttle, on which limits are extremely close, is actuated by the heart-shaped cam.



THE five-tooth sprocket (above) before and after forming the teeth.

The eight-tooth projector sprocket is made on the same fixture as the five-tooth camera sprocket. (below)



Cores Baked in Continuous Gas-Fired Oven

By HENRY M. LANE

IN the summer of 1927 the Packard Motor Car Co. experienced a considerable increase in the demands on its core room, and it was evident that something had to be done to increase the output. First, a study of the 24 existing ovens was made to see what their possibilities were. These were forced draft auxiliary air ovens, each taking two racks, and they were arranged in batteries of from four to six ovens on each fire box.

When using the rack-type core ovens it is necessary to maintain sufficient space back of each core maker for the placing of a rack. In addition, between each pair of core makers' benches there must be maintained a sufficiently wide passage for the operation of the lift trucks in handling the racks. This arrangement worked out so as to require between 80 and 100 sq. ft. of building for each core maker, and this is exclusive of oven space and general aisles at right angles to the core makers' benches. It was found that to increase the output much would require a considerable increase in the area occupied by core makers.

Next a study was made of various types of conveyor ovens fired with either gas or oil. The existing building limited the type of equipment which

could be used in the core room. In the first place the core room was situated between a three-story building on one side and a reinforced concrete sand bin 40 ft. high on the other. In addition to this, the roof construction of the core room proper restricted the height of any equipment that could be placed within the building.

Various Types of Ovens Considered

Several schemes were considered and propositions were made by four or five manufacturers. Among the propositions considered first were vertical continuous ovens for different baking times. This type of oven occupies a minimum of floor space, but it introduces serious handling problems in getting the sand to the core makers, the dryers and plates to the core makers, the cores from the core makers into the oven and the baked cores away from the oven.

The height of these continuous ovens was determined by the baking time and the amount of work that could be put into each one.

All of the other ovens considered in connection with the study were arranged with some form of horizontal loading section, where the loading convey-

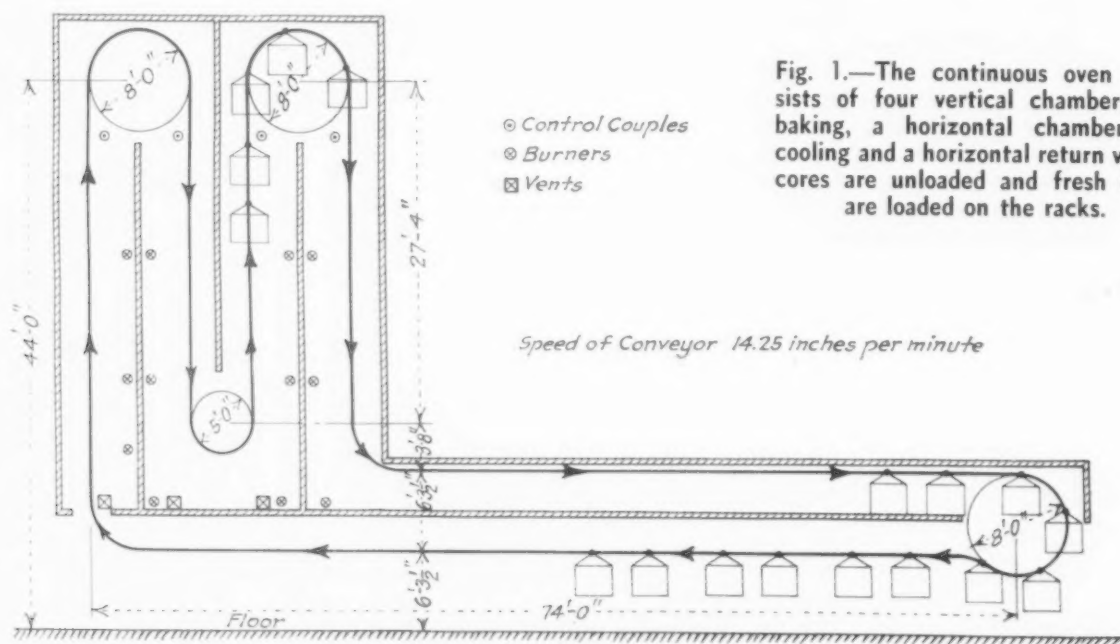


Fig. 1.—The continuous oven consists of four vertical chambers for baking, a horizontal chamber for cooling and a horizontal return where cores are unloaded and fresh cores are loaded on the racks.

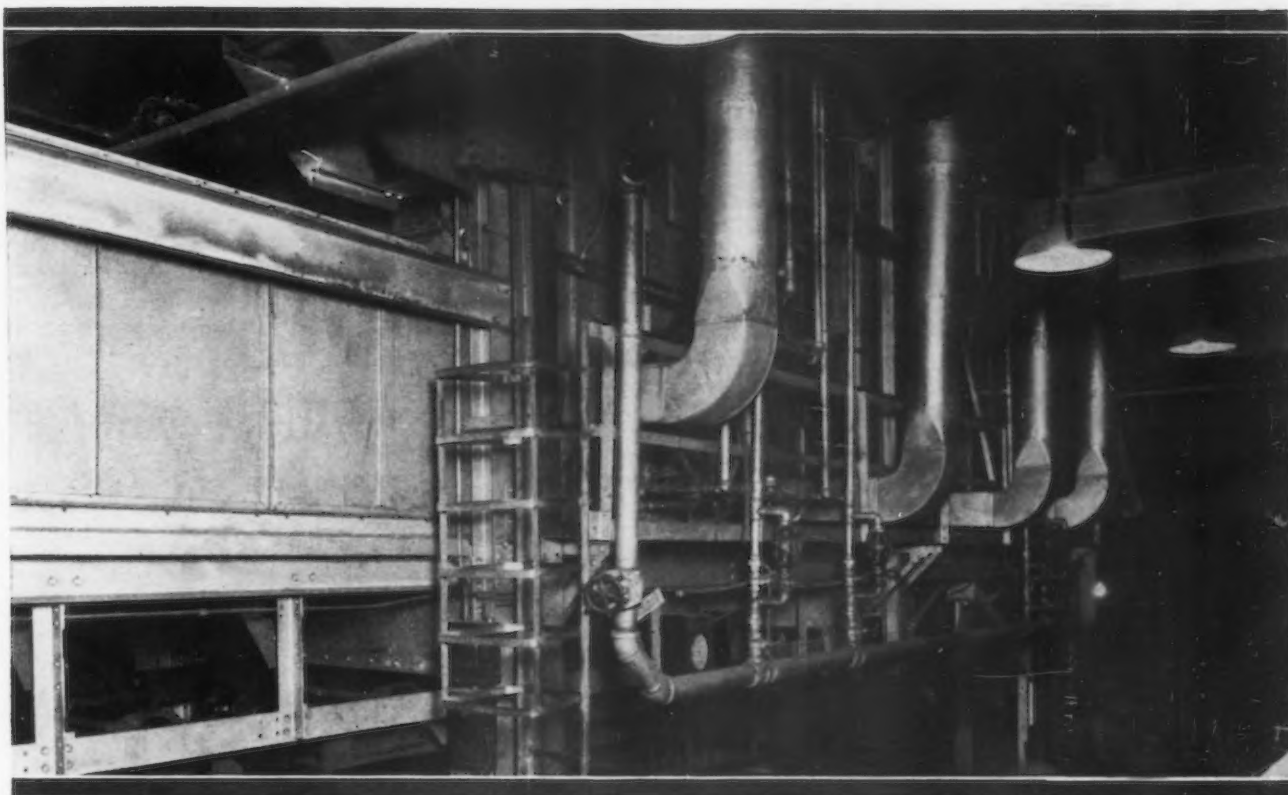


Fig. 2.—There are three burners, one arranged above the other, for each vertical heating chamber. Each set of three has its own temperature control. The dials of two of the recording controls can be seen back of the piping near the bottom of the illustration. ▲ ▲ ▲

ors or baskets passed horizontally across the room for the stripping of baked cores and the placing of freshly made cores. In practically all cases the plates and dryers were to be returned to the makers on the carriages that carry the cores through the oven.

The several different baking times were reduced to a square foot hour basis, and it was found that the 5-hr. bake class required the maximum of oven space. These cores required 5-hr. baking in the rack-type ovens. It was believed, however, that in the continuous ovens it would be possible to reduce the time for several reasons. The rack-type oven is filled by placing in it two cold racks both full of cores. Even though the temperature of the empty oven may have been up to the required baking temperature just previously to introducing the cold racks, the large mass of cold material introduced will cause the temperature to fall to approximately one-half the maximum baking temperature required. For this reason the temperature in an oven of this kind starts relatively low, and remains low during the time that most of the moisture is being driven off and the metal work of the racks and plates is being heated to the baking temperature.

To change these conditions would have necessitated some arrangement by means of which an ex-

cessive number of heat units could be introduced into the rack-type oven during the first of the bake, and the operator would have to be very careful as the period approached when the moisture would all be driven out and the operation of hardening and oxidizing the binder would be in progress. At this point he would have to check the amount of heat introduced into the oven. In a continuous oven having a series of burners the various steps of the baking can be provided for by introducing just the amount of heat required in each section and also by properly controlling the circulation.

Saving in Space and Baking Time

To accomplish the desired results an oven of the general type shown in Fig. 1 was decided upon. Different makers had different arrangements of the passes. One arranged for a high vertical pass at the entry, with three horizontal baking passes and a horizontal cooling pass, but the price was much above that of the successful bidder.

The oven installed was furnished by Holcroft & Co., Detroit, and will be described in detail later. When all the figures were assembled, none of the continuous ovens could justify the investment necessary from a purely dollars and cents standpoint, based on in-

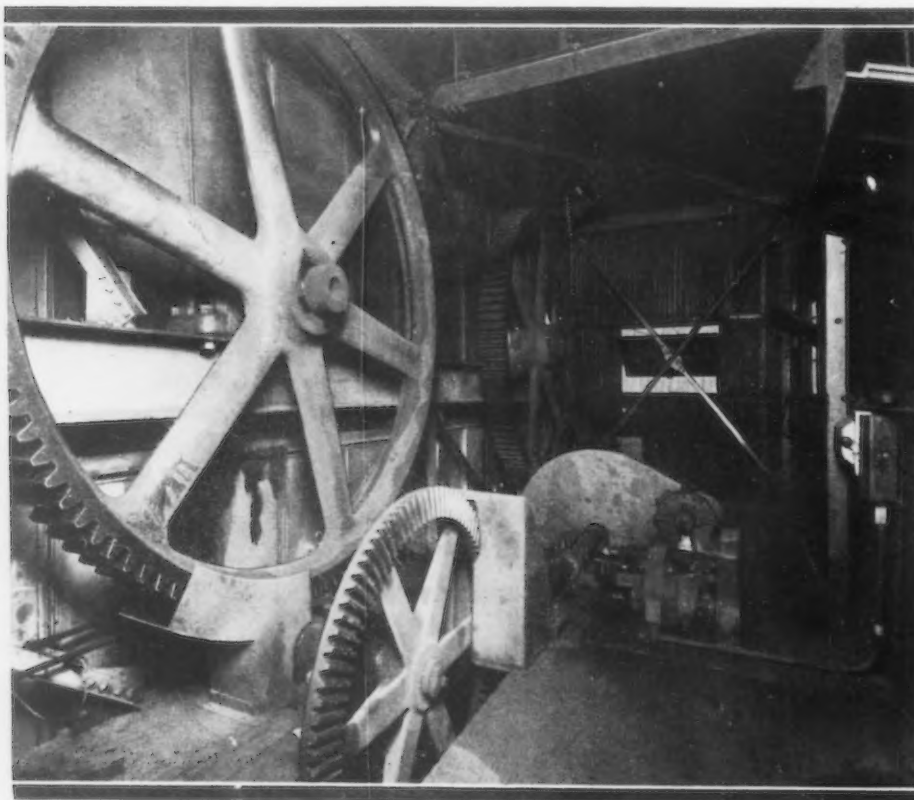
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INCREASED core requirements and space limitations caused the Packard Motor Car Co. to install a continuous gas-fired core oven. The space saved was equal to a building costing \$30,000. The baking time of the cores was reduced and a saving in overall costs was effected.

▼ ▼ ▼



Fig. 3.—Exhaust pipes from the vertical heating chambers connect with two headers which join on the outside of the building.



1918—The Iron Age, December 25, 1930

vestment, operating and upkeep expenses, as compared with the stationary rack-type ovens in use.

The operation of the continuous oven on the 5-hr. bake, however, could be so arranged as to reduce the number of square feet necessary per operator. In fact, the space saved was equal to a building costing approximately \$30,000. When this space saving or building investment saving was taken into account the 5-hr. bake continuous oven showed a substantial total saving.

When the oven was installed and tested, the predicted results as to entry conditions were realized to such an extent that the cores formerly requiring 5-hr. bake were baked in 3 hr. and this made it possible to pass through this oven the 4- and 3-hr. bake cores according to the former schedule.

As originally installed, the carriages for conveying the cores through the ovens were equally spaced so that the workmen could step between the racks on either side in stripping off the cores and in loading the oven. Later it was found that all work could be done from one side of each rack and the racks were re-spaced so as to place them in pairs which provided for seven more racks, a total of 56.

Four Vertical Baking Chambers

The oven consists of four vertical chambers for baking, a horizontal chamber for cooling and a horizontal return for the racks, where they travel through the unloading section and a section where the makers put the cores on the racks.

The oven shell of the vertical baking chambers is of steel construction, with heavy insulation between the metal sheets. The steel frame carrying the shafts with their sprockets and the other equipment is on the outside and is made as nearly independent of the oven as possible. As shown in Fig. 1, the centers of the main sprockets are 44 ft. from the core room floor and the horizontal travel of the racks in the core room is 74 ft.

There are three gas burners in each vertical baking chamber, located as shown in Fig. 1. Where the cores enter the

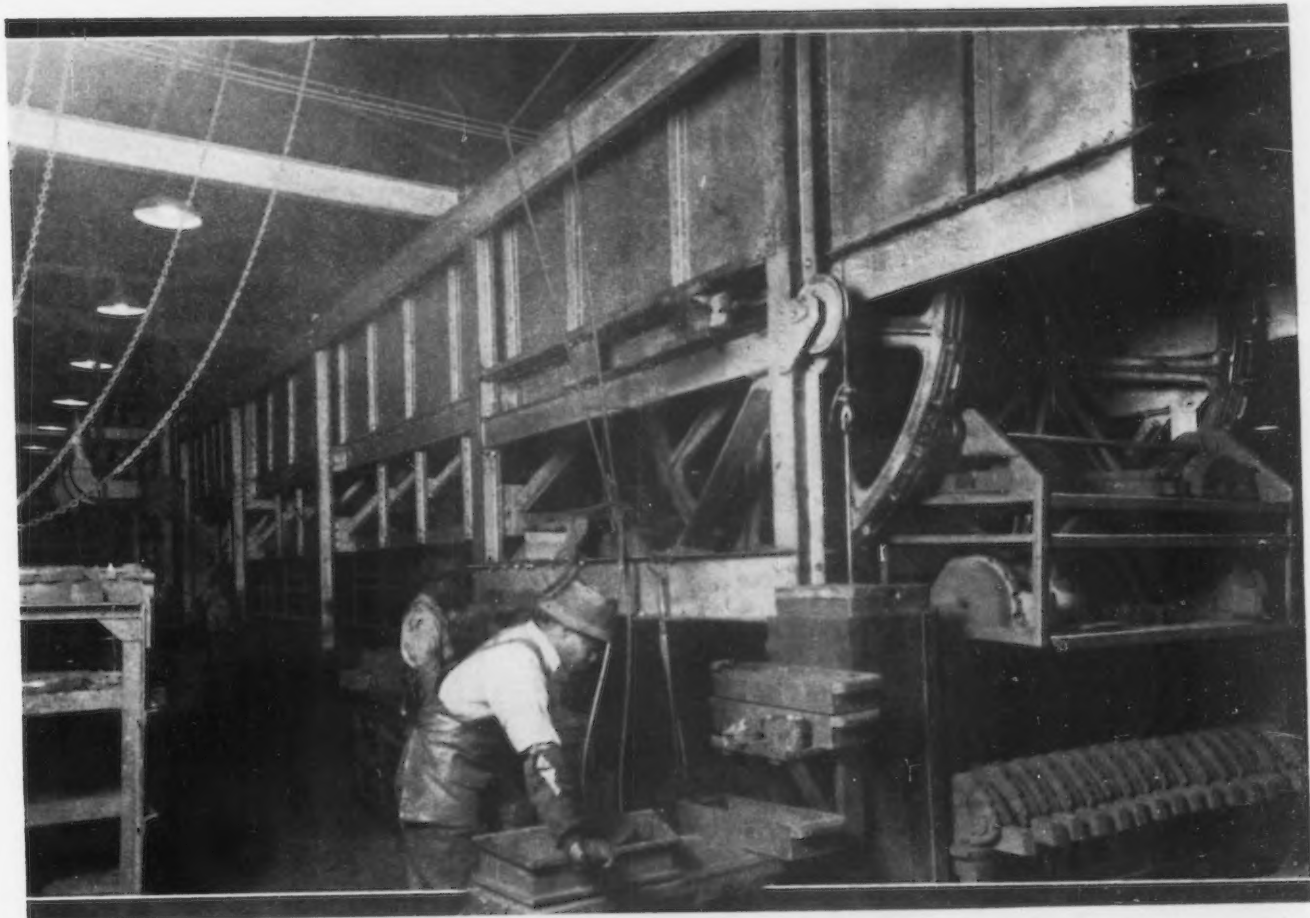


Fig. 4.—Arrangement of motor and gearing effects sharp reduction in speed of sprockets.

Fig. 5.—At the exit end of the oven the cores are removed and inspected, and core plates and dryers are returned to the racks, later to be taken from the racks by the core makers.

Fig. 6.—Benches where heavy cores are made. Sand is delivered to the benches by monorail. The cores, after being made, are blackened and placed on oven racks.





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Fig. 7.—Barrel cores are placed in dryers on skids, from which they are transferred by the core makers' helpers to the oven racks.

oven there is a vestibule (not shown in Fig. 1) which fits the racks closely and prevents any rush of air into or out of the oven at the entrance point.

The horizontal cooling section is insulated and there is an arrangement of ducts and a fan (not shown in Fig. 1) which draw in cold air at the outlet point and circulate it about the advancing cores and racks so as to cool them and at the same time preheat the air on its way to the oven.

Burner Temperatures Controlled

The general arrangement of the burners and control is shown in Fig. 2. There are three burners in

each vertical section, one arranged above the other, and each set of three has its own temperature control. The gas is reduced to zero pressure at the burner, and the amount of gas entering each burner is controlled by the amount and pressure of the air passing the venturi arrangement in the burner. Each set of three burners is controlled by a pyrometer point placed in the oven, as indicated in Fig. 1. If the temperature rises above the point for which the instrument is set, the gas supply is cut off and only the pilot light remains burning.

The dials of two of the recording controls can be seen back of the piping in the center, near the bottom of Fig. 2. This illustration also shows four exhaust pipe connections with the bottom of the vertical drying chambers. There are four of these outlets on each side of the oven. The pipes connect with a header on each side, and the two headers join on the outside of the building, as shown in Fig. 3. The exhaust stack contains a venturi section, and there is a fan in the base which controls the exhaust by a blast nozzle below the venturi section. The amount of exhaust from each section of the oven is controlled by suitable dampers in the outlet pipes.

Fig. 2 also shows the horizontal cooling section extending to the left of the main oven.

A general view of the machinery platform near the top of the oven is shown in

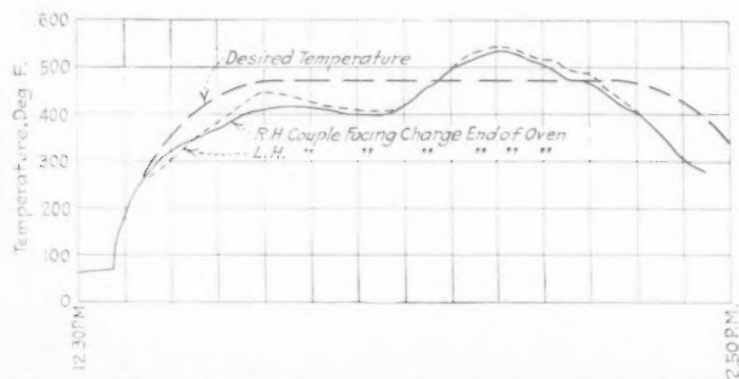


Fig. 8.—The continuous lines represent the temperatures in different parts of the oven, as obtained by passing two thermocouples through, one being attached to each end of one of the drying racks. The dotted line shows the ideal temperature requirements.

Fig. 4. The drive illustrates what a reduction in speed means in the design of parts. The small high-speed motor in the center is connected by a silent chain with a Reeves variable speed limit. This, in turn, is connected by another chain reduction with a gear reducer, and beyond this a pair of gears again reduces the speed to the jack shaft. The jack shaft is fitted with beveled pinions driving beveled gears, which are connected with short shafts carrying pinions for driving the main gears on the head or sprocket shafts. The large gears on the sprocket shafts have a surface speed of only a few inches per minute.

The exit end of the oven is shown in Fig. 5. The man in the foreground is inspecting and surfacing cores as he takes them from the oven. As much of this inspection work as possible is done in the immediate vicinity of the discharge end of the oven. Cores are taken from both sides of the oven, and the core plates and dryers are returned to the racks and later taken from the racks by the core makers or their assistants.

Benches Arranged on Both Sides of Loading Section

Core makers who are turning out the heavy cores for transmission and other large blocks are shown in Fig. 6. Sand is delivered to the core benches from a monorail by means of a man-riding trolley equipped with two sand bins with undercut gates. This man delivers the different grades of sand required to the bins over the core makers' benches.

After the cores are made they are sprayed with blackening, as shown in the center of the illustration. The blackened cores are then placed on the racks as they pass along beneath the oven.

The opposite side of the loading section of the oven is shown in Fig. 7. The men in the foreground

are making barrel cores, two at a time, and placing them in dryers. Each core maker has a pair of skids opposite his core bench, which will hold a number of these dryers, and the helpers place the cores in the ovens to dry as they find space on the advancing racks.

Comparative Costs

The estimate on the performance of the oven before it was built was that it would dry a pound of sand with a gas consumption of 0.61 cu. ft. of city gas. Several tests have been run at different times by the Packard Motor Car Co. and the gas company. In July, 1929, a test was run to compare the cost of baking in the regular coke-fired ovens of the rack type and in the continuous ovens.

In the case of the coke-fired, rack-type ovens it was necessary to consider the cost of fuel, the labor of firing, the removal of the ashes, and the labor of handling the cores to and from the oven, and to reduce this total cost to tons of sand dried. This calculation resulted in a cost of 70c. per ton, or 35c. per 1000 lb. of sand dried.

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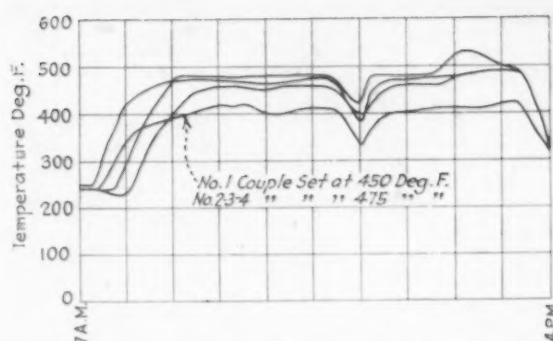


Fig. 9.—Control couple temperatures for an entire day's run of the four baking chambers.

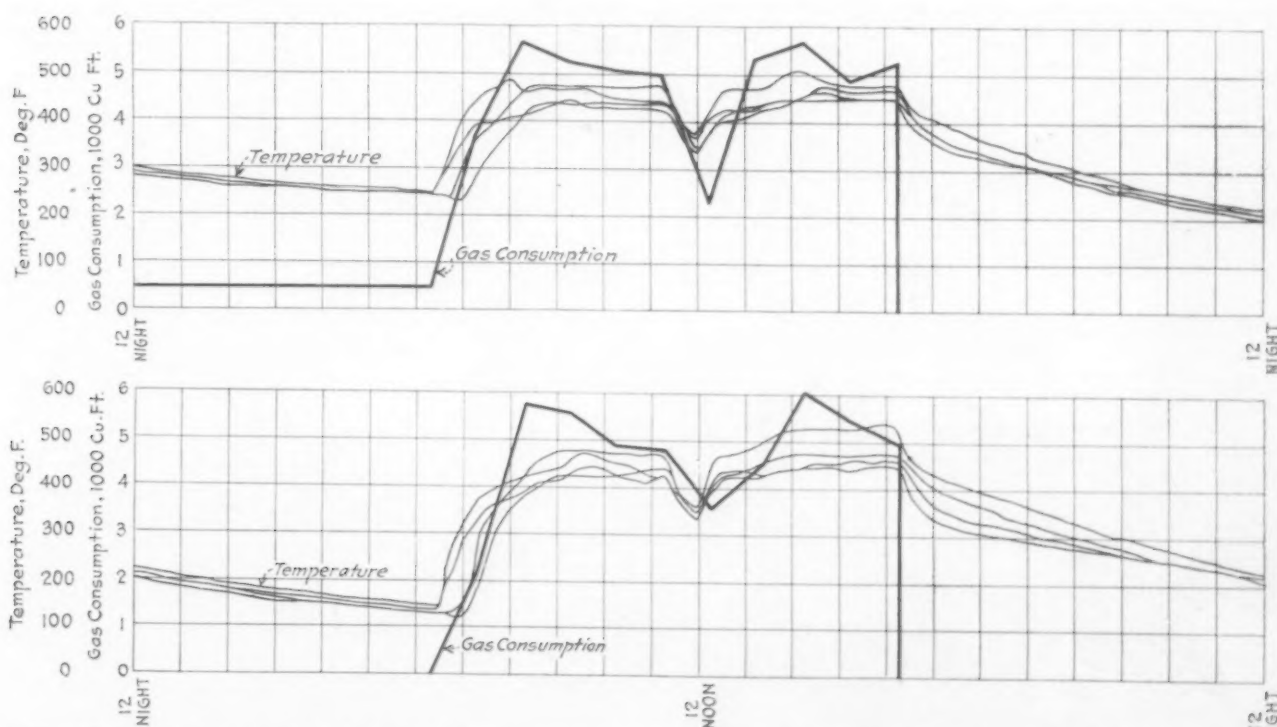
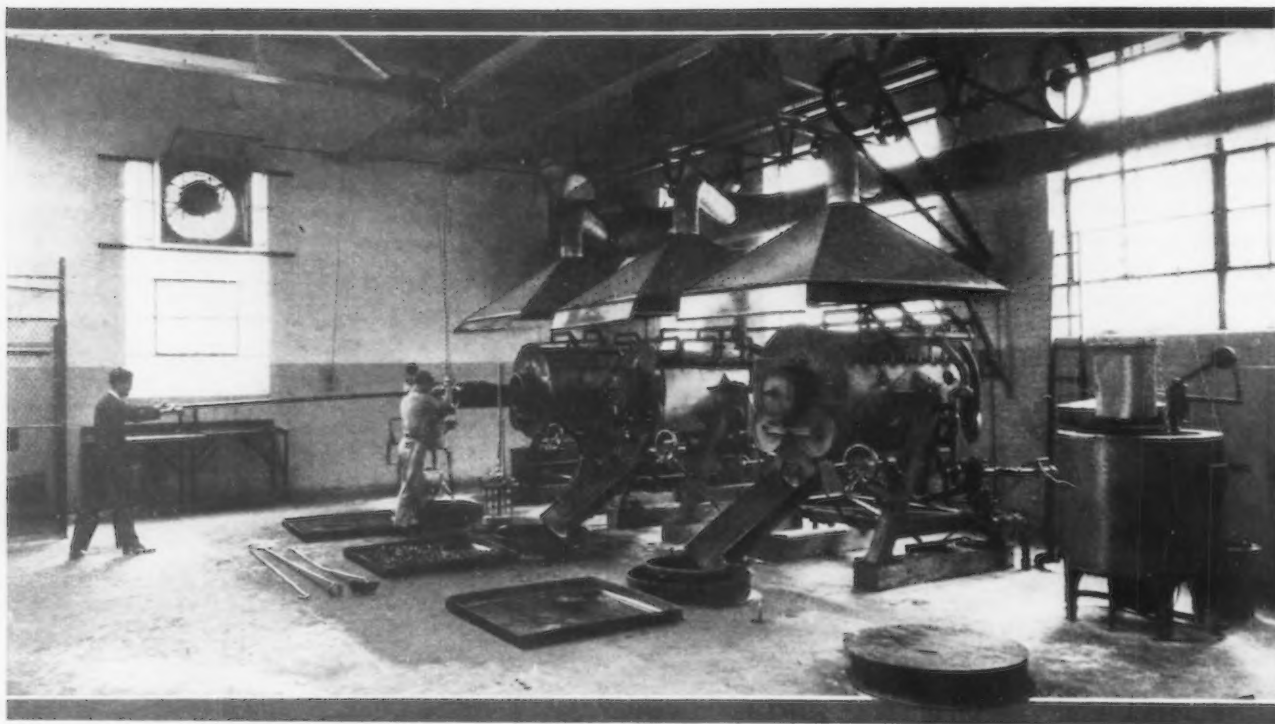
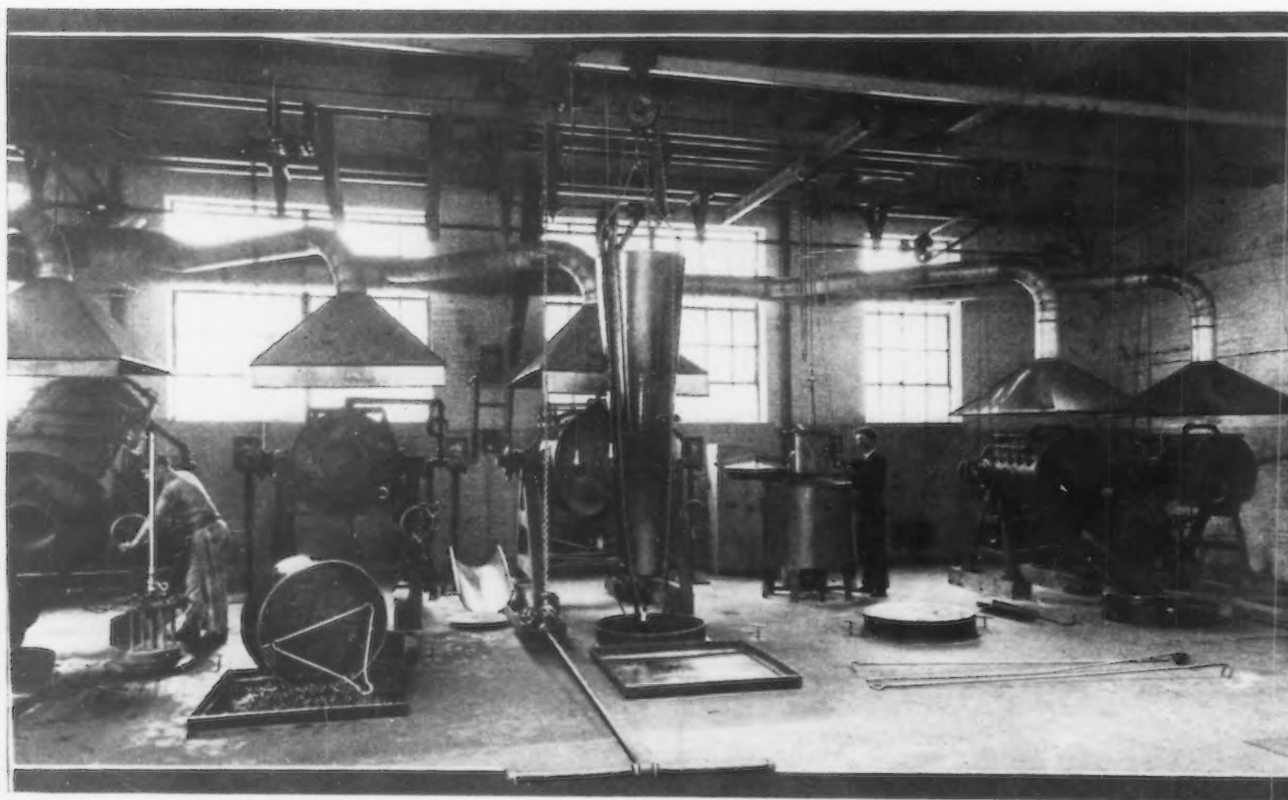


Fig. 10.—The upper curves show the gas consumption compared with temperatures when the pilot lights were burned for the entire 24 hr. The lower graph shows how gas is saved by turning out the pilot lights at night.



THE rotary gas furnaces are charged by means of a scoop constructed to hold the entire charge and supported by an electric hoist. They are installed at a height calculated to insure a rapid flow of the work into the cooling medium. A 36-in. propeller fan at the upper left provides for the room ventilation. ▲ ▲ ▲

THE discharge from the furnaces is through a long steel cone into a perforated pan in a deep oil tank in the room immediately below. The Homo tempering furnace is located between the batteries of large and small American gas rotary furnaces. ▲ ▲ ▲



Standardizes Process of Hardening Screws

By J. W. MARSHALL



THERE are five outstanding factors in the maintenance of uniformly heat-treated products, such as the hollow set screws and cap screws made by the Allen Mfg. Co., Hartford, Conn. First, the steel used must be uniform; second, the temperatures of each treatment must always be the same; third, the length of

time the work is left in the furnace must not vary; fourth, the time the work is in the air on its way from the furnace to the bath must be kept at a minimum and constant; and fifth, the temperature of the cooling medium must always be the same. By the control of these five factors standardized heat treatments are assured, and, to effectively control these factors, the Allen company has installed a complete new heat-treating plant with some features of unusual interest.

Gas is used as the heating medium for all the furnaces except the drawing furnace, for which electricity is used. The selection of gas was based upon considerations of economy; the results of the searches conducted by the company indicated that to have secured as low a cost per useful heat unit, it would have been necessary to run the furnaces continuously and at night, when the low electric rate is effective.

With gas, the furnaces can be allowed to stand idle without a great loss in efficiency, whereas with electricity it is necessary to conserve all the heat and make it do useful work. This means the furnaces would have to be insulated against heat losses, which renders the equipment expensive. Then, there would necessarily be a great loss of high-priced heat every two hours when the furnaces are unloaded and loaded, unless the continuous feeding type of furnace were used. With gas, the furnaces cannot be

FOR hardening screws in the Allen plant, equipment has been located to get quick quenching, apparatus has been supplied to minimize manual handling, gas is favored in part for source of heat and special attention has been paid to ventilation of the heat-treating department.



so completely insulated since it is necessary to pump air through them.

The equipment installed consists of two large and three small American-Gas rotary furnaces and of one Leeds & Northup electric Homo drawing and tempering furnace. The large gas furnaces are each designed to handle 500 lb. of work per heat but actually 350 lb.

only is run each heat, in order to make sure that an even temperature is obtained throughout the mass. In this way greater consistency is obtained.

Each charge is weighed before being put in the furnace to prevent overloading the furnace and to assure that the heat treatment of all the products will be uniform. As a further precaution to make certain that all the work inside the furnaces has the same temperature, the company had the heads of the furnaces made to extend farther than normal into the retorts, since the work located at the front ends of the furnaces may not be as hot as that in the middle. In this manner the matter of having work at a lower temperature at the front end of the furnace is avoided.

The charges are all run for about 90 min. at a temperature of about 1650 deg. Fahr., and the temperature is held within 10 deg. of this temperature by means of automatic regulators. A small quantity of hardening compound is put into the furnace with the work to release gases that exclude air and maintain a reducing atmosphere in the work chamber. In this way decarburization is prevented. It is exceedingly important that there be no decarburization on the sharp edges of the company's product. For example, if the edges of the wrenches should be decarburized, these edges would become round in use and thus set up a tremendous leverage that would be apt to break the screws on which they are used.

In order that the heated work will be in the air as short a time as possible while passing from the furnace to the oil bath, the furnaces are placed just enough higher than the normal height to obtain a quick sliding action along the conducting scoop to the steel cone that guides the work through the oil bath into a perforated pan at the bottom of the oil tank. When the furnace is dumped, the work moves quickly into the oil, allowing practically no chance for oxidization to occur.

Six oil tanks with a capacity of about 12 bbl. each are provided for quenching. These tanks are about 12 ft. deep and 30 to 40 in. in diameter. They are all hooked up in a common piping system so that the oil can be drawn out of any tank and back to that tank or to another tank, and also so that all the tanks can be kept at the same level. However, the oil in the various tanks is maintained at different levels owing to the nature of the work heat-treated in the different furnaces.

When a load is to be dumped, circulation in the proper tank begins and this circulation continues during the dumping operation. When another furnace is to be dumped, the valves are shifted and the process repeated.

The tanks extend through the floor of the heat-treating department to the room beneath. The oil is cooled by pumping it through a battery of truck radiators arranged in series in the lower room. A large blower forces a stream of air through these

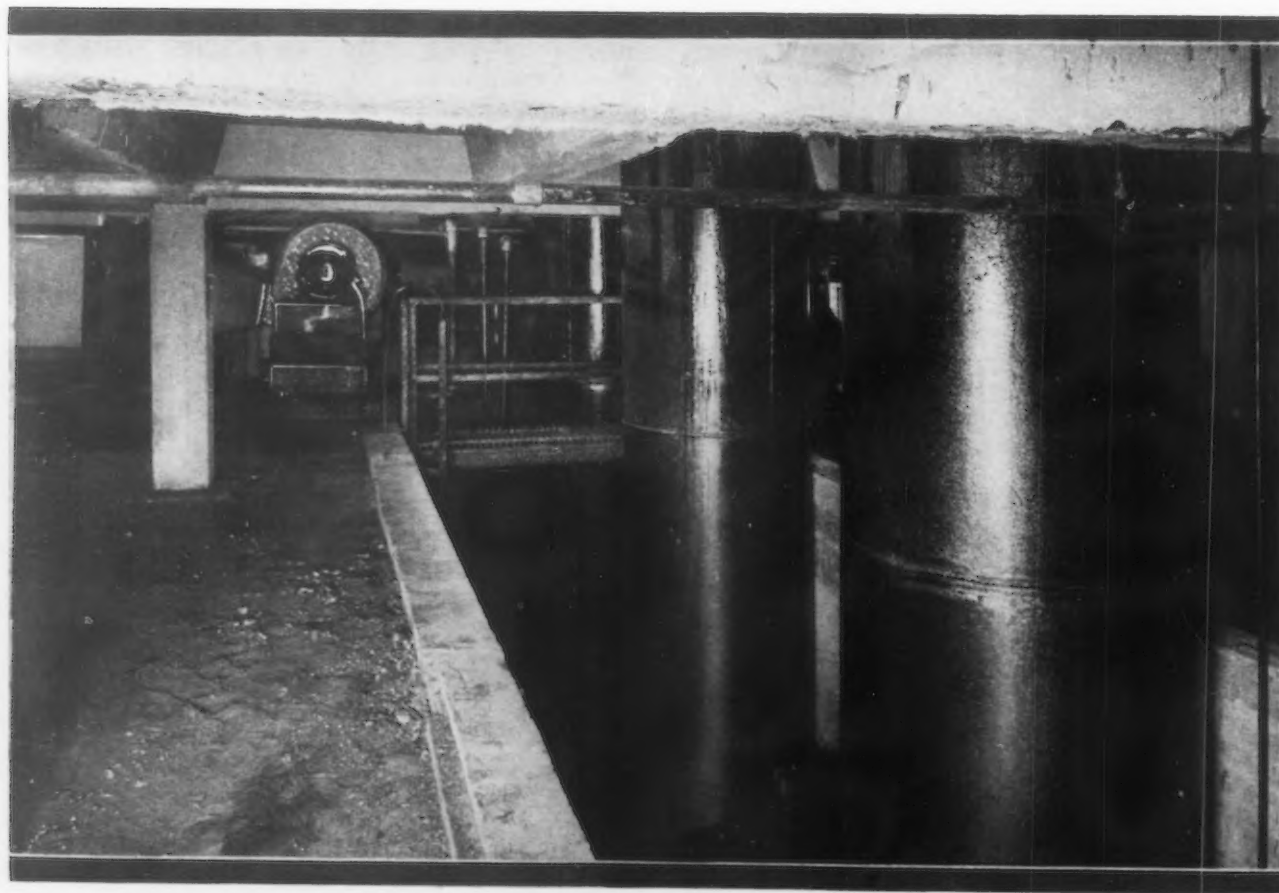
radiators, to remove the heat from the oil. After passing through the radiators, the oil flows through a loop of pipe up into the hardening room and down again to the lower room. A thermometer is located in the top of this loop, to record the temperature. The exact temperature is therefore known at all times. An effort is made to keep the oil in all the tanks at a temperature of 120 deg. Fahr.

The work is drawn and tempered to temperatures up to 1200 deg. in the electric Homo furnace, by means of which the difficulties involved in drawing a large mass uniformly have been effectively overcome. In this furnace, a motor-driven fan, which is part of the furnace, forces the heated air through the material in both directions and brings the center of the mass up to temperature at the same rate as the outside. The temperature is automatically controlled at all times, leaving nothing to guesswork or chance. An additional feature is a cut-off which operates to slow down the incoming heat as the limiting temperature is reached, which prevents overrunning.

Ventilation of the room is effected by two different systems. One system consists of a suction blower connected to hoods located over each of the furnaces. The other consists of a 36-in. propeller fan located high up on one of the side walls. Fresh air enters the room through shutter-controlled openings in the bottom of the wall at the back of the

(Concluded on page 1977)

THE oil quenching tanks are in the room beneath the furnace room. Immediately behind them may be seen the truck-type radiators used for cooling the oil and in the background is the blower that delivers air over the radiators.



How Strong Are Welded Joints in Tubular Members of Airplanes?

RESULTS of a series of interesting tests on the strength of welded joints in tubular members for aircraft were presented in a paper at the fall meeting of the American Welding Society in Chicago, during the National Metal Congress. The investigation was made by the Bureau of Standards in cooperation with the National Advisory Committee for Aeronautics for the aeronautics branch of the Department of Commerce. The paper, prepared by H. L. Whittemore and W. C. Brueggeman of the bureau, and presented by the former, was entitled "Strength of Welded Joints in Tubular Members of Aircraft."

Forty joints were welded under procedure specifications and tested to determine their strength. The weight and time required to fabricate were also measured. Chrome-molybdenum seamless steel tubing in five sizes, from $\frac{3}{4}$ in. outside diameter by 0.028 in. wall thickness to 2 in. outside and 0.065 in. wall thickness, was used to make the test specimens. Chrome-molybdenum sheet steel of the same analysis was used in making the reinforced joints. The report included tables showing the typical physical properties of the tubing in tension and compression, chemical analysis of the tubing, strength of coupons from the reinforcing sheets and

FIVE sizes of chrome-molybdenum steel tubing were used in investigating the strength of welded joints in the tubular members of airplanes.

Three joints were made: Butt, T, and lattice.

The point of minimum strength and hardness of the base metal is sharply defined and is located about $\frac{1}{2}$ in. from the center of the weld.

It is more satisfactory to gain strength for T joints, loaded to high bending stresses near the joint, by increasing the size of the tube rather than by adding plates, straps, etc.

Efficiency of an unreinforced joint ranges from 55 to 77 per cent. Reinforcement by U straps increases the efficiency to 87 per cent. The best reinforcement for the lattice tube is one which reinforces it against collapse of the tubes.

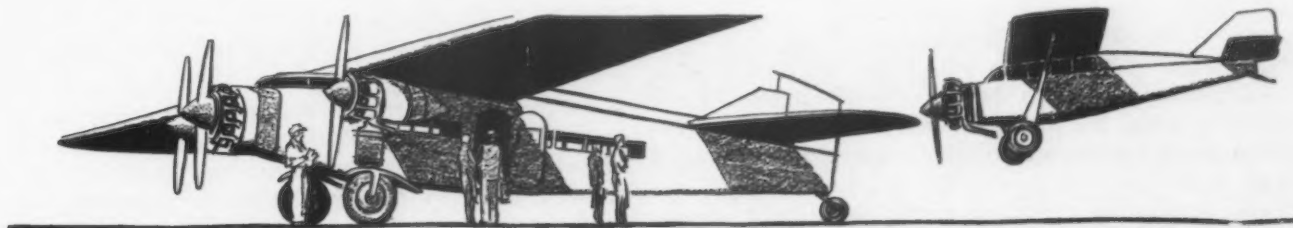
the chemical analysis of the welding wire.

Butt, T and lattice joints were made. In the T joints the tubes met at an angle of 90 deg. In lattice joints the angle between intersecting tubes was 60 deg., except one, which was 45 deg. An Amsler testing machine was used for all tests. Welding was done under procedure specifications for oxy-acetylene welding for aircraft structures. The specimens were welded in a rotating jig that was adjustable to fit all joints. Pieces of each joint were weighed before welding, and the joint was weighed after welding and checked with the weight of the welding wire.

Tensile and compression tests were made of butt joints in the five sizes of tubing, and the efficiency and maximum stresses of all the joints were plotted. The efficiency of butt joints ranges from 78 to 93 per cent for both tension and compression, based on the strength of the unwelded tube. Hardness tests were also made of the joints. Efficiency of T joints showed varying percentages.

Conclusions Reached

The more important conclusions arrived at in the tests were: The point of minimum strength and hard-



ness of the base metal is sharply defined and is located about $\frac{1}{2}$ in. from the weld center. Here the metal may have strength ranging from 80,000 to 100,000 lb. in tension and 70,000 to 95,000 lb. in compression and a Vickers number as low as 165. For T joints loaded to high bending stresses near the joint, it is probably more satisfactory to gain strength by increasing the size of the tube rather than by adding plates, straps, etc.

Where the joint is loaded in such a manner that bending stresses are kept to a low value, the efficiency may best be increased by welding a U strap around the joint. The efficiency of an unreinforced joint ranges from 55 to 77 per cent. Reinforcement by means of U straps increases the efficiency to 87 per cent. Strap reinforced joints, in which a tube is en-

circled by a circumferential weld, are, however, subject to a reduction in the tensile strength of this tube. The joint can be made almost as efficient by welding large triangular gussets between the intersecting tubes, but the weight and time required to fabricate are excessive.

The best reinforcement for the lattice tube is one which reinforces it against collapse of the tubes. This reinforcement may be either an inserted plate or a strap welded around the joint. Both methods increase the strength of the unreinforced joint by about 20 per cent. When gusset plates are used for reinforcement a decided gain in strength is obtained by inserting one plate in all tubes rather than welding several plates in the angles between the tubes. The paper was not discussed.

Patches Welded on to Prevent Burning of Pot

RAPID destruction of an annealing pot has been overcome by welding patches over the affected parts. The illustration is of a cast steel shell weighing about 5000 lb. Its length is about 76 in.; width, 52 in., and height, 43 in. This shell is used in an annealing furnace and forms the inside wall of a water-sealed furnace. There are two other shells, one placed on top of the other to form an air-tight chamber.

Heat is applied with four oil burners in a chamber



Welded patches of alloy steel on cast steel shell, to withstand destructive action of hot oil flame.

outside of the steel shell, the outer wall of the chamber being of firebrick. It was found that the steel shell was destroyed rapidly at the places shown in the illustration as patches. The heat of the flame seemed to be too great for the steel shell to last any length of time.

It was therefore suggested that, if an alloy steel

wearing surface could be put on to this surface, using a chromium-nickel alloy steel, it would prevent the burning of the shell at the places referred to. The alloy steel used contained about 25 per cent nickel and 18 per cent chromium. The patch was put on by taking a series of 5/16-in. welding rods, bending them so that they lay close to the surface of the shell and parallel with each other, the space between rods being about 5/16 in., and using arc welding.

The four patches, on the four corners of the shell, are 24 in. wide by 32 in. long, and about 11/32 in. thick. This surface is expected to withstand a temperature of 2000 deg. Fahr. While the patched shell has not been in use long enough to get definite data, it is expected that it will last at least three to four times as long as it did without this treatment.

This work was done by the Mossberg Pressed Steel Corp., Attleboro, Mass., using a Lincoln 300-400 amp. machine.

Strength of Coal Briquettes

Reports on some experiments carried out to determine the influence of the size of coal and the proportion and quality of pitch on the strength of briquettes made from bituminous coal are offered by A. Spilker, in a recent issue of *Brennstoff Chemie*. The tensile strength and breaking strength of the briquettes were determined by methods used in the cement industry, and the cohesion was determined by a modified "drum" test.

The briquettes, according to a translation in *Iron and Coal Trades Review*, were allowed to dry to constant weight before being tested. By varying the size of coal within the limits usual in briquetting, it was possible to bring about greater variations than were produced by varying the proportion of pitch by 25 per cent. Other conditions being equal, coal of 3 mm. to 0 gave the strongest briquettes.

An increase in strength was produced also by using a more finely-ground pitch. Using a softer pitch gave briquettes of higher cohesion but lower tensile strength; with too soft a pitch the briquettes failed in the drum test.

Prolong Iron Ore Resources by Beneficiation

THAT beneficiation of iron ore in the Lake Superior district will prolong, to a considerable extent, the life of the mines in that region seemed to be the majority opinion at the annual meeting of the iron and steel division of the American Institute of Mining and Metallurgical Engineers, which was held at the Hotel Stevens, Chicago, during the National Metal Congress this fall. The meeting brought out the fact that many operators in the western Mesabi range in Minnesota are today treating successfully ore which formerly was considered of indeterminate value and much of which was thought worthless.

Probably the most important factor in the beneficiation of iron ores, outside of increasing the iron content, is sizing, stated Ralph H. Sweetser, consultant specializing in blast furnace problems, Columbus, Ohio, in his paper on "Beneficiation of Iron Ores from the Blast Furnace Viewpoint." He declared that spasmodic attempts at sizing the coke, ores and limestone have resulted in better blast furnace results. He further cited the conclusions of the United States Bureau of Mines that "the size of materials is probably one of the most important of the many factors that govern the efficiency of furnace operation."

Mr. Sweetser said that "in practically all cases where Lake Superior ores are sized before jigging, the different sizes are combined into one ore after concentration and shipped as a single washed ore with all the different sizes. Some large steel companies, however, are already putting a top limit of as low as $\frac{3}{4}$ in. and even $\frac{1}{2}$ in. on ores that are crushed and washed. It seems to me that we blast furnace men

should thoroughly study the question of shipping the washed ores in two or more groups of sizes instead of reassembling all the lumps and fines. Another step in the refinement of blast furnace practice would be the screening out of the finest ore at the blast furnace and putting the fines through the sintering plant in the first place, instead of putting them into the furnace first and then sending them to the sintering plant as flue dust."

Lake Superior Ores Are Higher Grade Than Foreign

Mr. Sweetser pointed to the observation of Fayette S. Warner that competition between the beneficiation of American ores and the importation of foreign ores will increase greatly in the next 10 years, stating that one factor overlooked by Mr. Warner is the freedom of Lake Superior ores from deleterious elements when compared with foreign ores. While different writers have called attention to the increase of silica in the average ores shipped from the Lake Superior region, the increase from 1902 to 1928 amounting to 2.20 per cent, Mr. Sweetser believes that this development has been counterbalanced by a corresponding decrease in

the percentage of ash in the coke, and by the progress made in the art of smelting iron ores.

In his paper Mr. Sweetser singled out the operation of the Dover furnace at Canal Dover, Ohio, for a period of six months ended April 30, 1896, as one of the most remarkable blast furnace records of a generation ago. The burden consisted of Lake Superior ores averaging from 57.11 to 64.44 per cent iron and from 6.50 down to 2.85 per cent silica. Some siliceous ore and mill cinder were added to increase the silica so as to give

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Some large steel companies are already putting a top limit of as low as $\frac{3}{4}$ in. and even $\frac{1}{2}$ in. on ores that are crushed and washed.

Probable life of available Lake Superior iron ore is thirty years more of mining. If methods could be devised for concentrating low-grade ores, the time of exhaustion would be greatly extended.

Many low-grade ores could be profitably treated, first by reducing them to the metallic state, then crushing them to a suitable size and concentrating magnetically, the high-grade product going to the open-hearth or electric furnace and the low-grade to the blast furnace.

▼ ▼ ▼

6 per cent of silica in the furnace, exclusive of that introduced with stone and fuel. The fuel was standard Connellsville coke. With an average burden yield of 58.99 per cent pig iron for the six months, the coke consumption was 1664.3 lb. a ton of pig iron, and the ratio of ore and coke was 2.203. The average analysis for the iron of that period was 1.23 per cent silicon, 0.034 per cent sulphur, and 0.079 per cent phosphorus. The off-iron remelted was 3.3 per cent of the total produced.

Performance of Columbus Furnace Noteworthy

"At the Columbus blast furnace (East) of the American Rolling Mill Co.," said Mr. Sweetser, "the average iron content of the ore in June, 1930, was 54.13 per cent, with an actual yield of 57.41 per cent pig iron compared with 58.99 per cent at the Dover furnace. The analysis of the coke was as follows: Ash 8.65 per cent, sulphur 0.46 per cent, volatile matter 1.28 per cent, and fixed carbon 90.07 per cent. The coke consumption per ton of pig iron was 1586 lb. The furnace produced merchant iron, made up to about one-fourth standard basic, one-fourth malleable iron and the balance foundry. The average silicon in the pig iron for the month was 2.02 per cent and the average sulphur 0.027 per cent. There was no pig iron over 0.050 per cent sulphur. The average silicon in the ore burden, exclusive of the silicon in the fuel and the flux, was 8.28 per cent."

Mr. Sweetser dwelt at length on the work being done by the Minnesota School of Mines at the University of Minnesota in an effort to enrich ores which are now considered too low in iron for merchantable iron ore. In 1919, the Federal and State stations jointly began experiments with small blast furnaces in order to investigate various problems of the smelting of iron ores and manganese ores.

The present blast furnace, 31 ft. 4 in. high with a 3-ft. hearth and 6-ft. 6-in. bosh and 4-ft. 6-in. stock-line, was designed and operated by the United States Bureau of Mines staff. The cost of constructing the furnace was paid out of special State legislature appropriations. The utilization of manganiferous iron ores was the first problem undertaken with this equipment, but iron ores and bauxite for the purpose of producing high alumina slags have been smelted in this furnace.

In addition to the experimental blast furnace which is estimated to have 6 tons capacity (but which really has a working volume capacity of 17 tons pig iron), there are the following furnaces and machines: one small sintering machine similar to the Greenawalt converter; one reverberatory iron furnace with hearth 72 x 60 in.; one full-sized cupola; one rotating kiln; one small sintering machine similar to the Greenawalt pan; several small electric furnaces; gas producers; complete crushing and grinding machines; several large-sized bins with converters and chutes for mixing and conveying the materials to any part of the furnace rooms or concentrating rooms.

The ore-dressing laboratory is equipped with full-size and also models of all sorts of washing, jigging, magnetic concentration, flotation and chemical concentration machines for iron ores and manganese ores.

Dean W. R. Appleby of the School of Mines told

Mr. Sweetser that the probable life of the available Lake Superior iron ore at the present state of the art is 30 years more of mining, but if methods could be devised for concentrating low-grade ores, the time of exhaustion would be greatly extended.

Lake Superior Ore Reserves Described

On Jan. 1, 1930, there were assured ore reserves in the Lake Superior district amounting to 1,368,332,932 tons, plus any extensions of present ore bodies which have been made, stated F. B. Richards, president Hanna Furnace Corporation, Cleveland, in a paper abstracted by J. W. Feiss. The figures are based on the latest study by M. C. Lake, chief geologist of the company. Mr. Richards declared that the extensions in the Lake Superior region have not been large and are almost negligible compared with the whole. The supply of assured ore, assuming an average of 67,000,000 tons yearly will be mined and shipped from now on, is thus reduced to a life of about 20 years.

Discussing the commercial treatment of ore, Mr. Richards explained that on the Mesabi range, "where the ore is finely divided, at several low-grade properties, the ore is being beneficiated successfully and the resultant concentrate is a splendid product, high in iron and very workable in the blast furnace. The latest results in concentrating work on this range show a recovery of about 90 per cent of the iron unit fed to the mills. As a matter of fact, it is the general opinion that all of the low-grade ore bodies on the Mesabi, so far known, lend themselves to treatment."

Prolonging Life of Superior Ores Is Important

Mr. Richards stressed the importance of prolonging the life of the Lake Superior ore production as long as possible, because of its ideal location and the cheap water freights for shipping the ore to lower Lake ports. He mentioned the fact that explorations on the old ranges in the district have been pushed of late years, but discoveries of good ore have been small. In Wisconsin there is an ore range at Baraboo and another at Mayville. As far as known at this time there is no great tonnage of these ores. There may be a limited tonnage produced in Missouri, probably never a great annual tonnage. Explorations in Canada along the north shore of Lake Superior and north of Lake Ontario have not produced any hematite, the ore bodies discovered being magnetites carrying considerable sulphur. However, these can be beneficiated, as the working of the magnetic deposits at Port Henry, N. Y., has shown.

The next greatest body of ore, excluding the Lake Superior district, which may be made available for shipment to lower Lake Erie ports is in Newfoundland, stated Mr. Richards, where reserves are estimated at 4,000,000,000 tons. If the St. Lawrence waterway should be constructed, these ores could be brought to the plants of the Middle West, although the water freight would be higher than from the Lake Superior districts. Furthermore, the Wabana ore mined in Newfoundland is not of the best quality.

Referring to the reduction in richness of ores in the Alabama district, Mr. Richards said that "it is conceivable that if large high-grade bodies of iron ore are found and developed near the northeast coast of South America, and fairly near transportation by

water, this district may, in the not very distant future, have to use these ores in connection with their Red Mountain ores, to bring up their yields and increase the output of their blast furnaces."

Ore Reserves of Large Companies Have 50 Years Supply

Some of the large steel companies have acquired properties in the Lake Superior district which assure them a supply to last 40 or 50 years, unless they greatly increase their output. In other words, the ownership of ore reserves is so unevenly divided that in some cases the supply will be exhausted in a comparatively short time, but the larger steel makers have protected themselves by buying from time to time sufficient property to give them the ore tonnage they need for probably the next half century. Ores examined in the Lake Superior district by the United States Bureau of Mines show that they can be treated at moderate cost which operators should be able to meet without difficulty.

A Round Table on Iron Ores

SUPPLEMENTING the session at which the foregoing papers were presented, an iron ore round table meeting was held in the afternoon. The chairman was C. B. Murray, who turned the session over to R. H. Sweetser. There was an attendance of about 100, comprising men from the ore ranges, a large number of operating blast furnace men, others in coal dressing and a considerable number active in ore beneficiation.

The meeting started with a discussion of the papers presented in the morning. A thorough-going discussion of the value of beneficiation of iron ores was participated in by a large number, being considered from many viewpoints. In particular, one speaker pointed out that two ores used by his company, the Hawkins and the Bruce, were beneficiated but entirely from the standpoint of helping the blast furnace operation. In particular a large amount of free silica was removed from the Hawkins ore by washing, with very great advantage to the blast furnace practice.

He questioned the conclusions drawn by Mr. Joseph in his paper regarding the flow of materials in a furnace at South Chicago, which also brought out an interesting discussion. The people interested in

iron ores pointed out that treated ore, in their opinion, should be sold on a basis comparable with the price of the old range ores, which did not seem to be agreed to by the blast furnace people present.

A similar attitude was taken by those interested in the sintering of ores. They believed sintered material should be sold for a higher price than iron ore because of the benefits it brought about in blast furnace practice. This brought about one of the most interesting discussions of the whole afternoon, the blast furnace people taking the attitude that sintered material should not command any higher price than iron ore which worked well in the blast furnace. Apparently the present feeling among operating blast furnace men is that no extra or higher price should be paid for sintered material.

Considerable discussion was brought about by Mr. Sweetser's proposal that, when crushing and washing ores, the various sizes should be shipped separately. One of the main troubles in carrying out this proposal is the difficulty of disposing of the sludge and very finely divided material. Those present interested in the washing of ore pointed out how very difficult it is to handle the sludge, which is exceedingly dangerous to ship as such and which must be mixed with other material. It was pointed out that there are several instances on record where ships have sunk when loaded with this material alone.

A very interesting feature of the afternoon was the proposal by Wm. H. Smith of Detroit that many low-grade ores could very profitably be treated by first reducing the iron to the metallic condition, then crushing to suitable size and concentrating magnetically, the high-grade product being handled in the open-hearth or electric furnace and the lower grade products being supplied to the blast furnace. His proposals created a great deal of interest. Unfortunately he had to leave the meeting and G. B. Waterhouse had to answer the various questions as well as he could, serving as pinch hitter for Mr. Smith. It looked for a while as if the meeting would develop into a discussion of direct reduction and the production of sponge iron, but the question of sintered ore again came to the front so that interest was diverted.

It is the intention to hold a similar round table discussion at the February meeting of the institute.



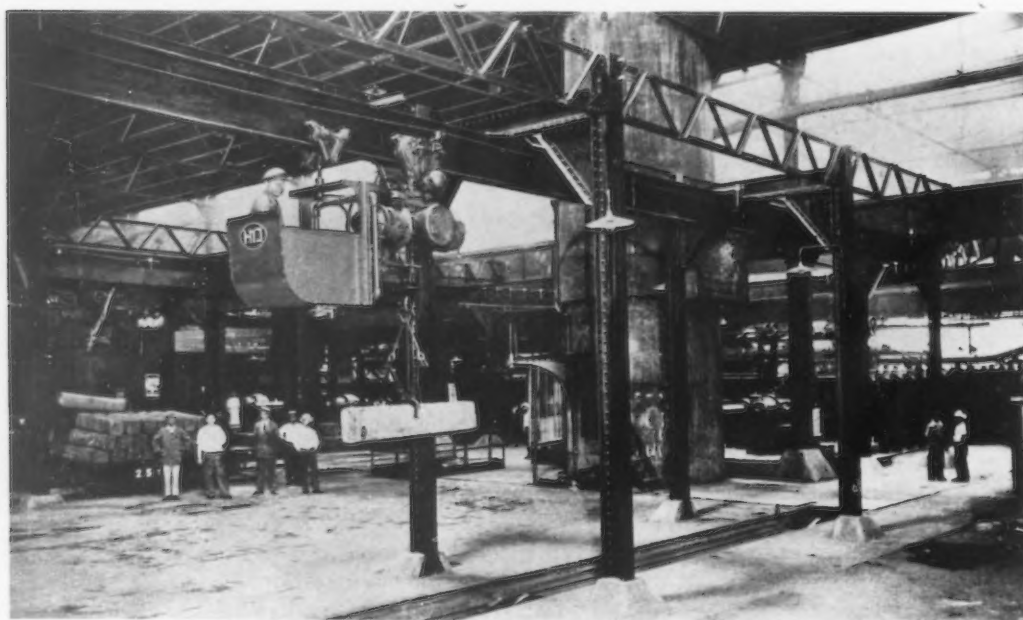
Japanese Adopt Semi-Continuous Sheet Production With German Mill

ABOUT a year ago the Friedrich Krupp A. G., Essen, Germany, installed a semi-continuous mill for rolling sheet bars and sheets in the Kawasaki Dockyard Co., Kobe, the largest sheet producer in Japan. As the Japanese

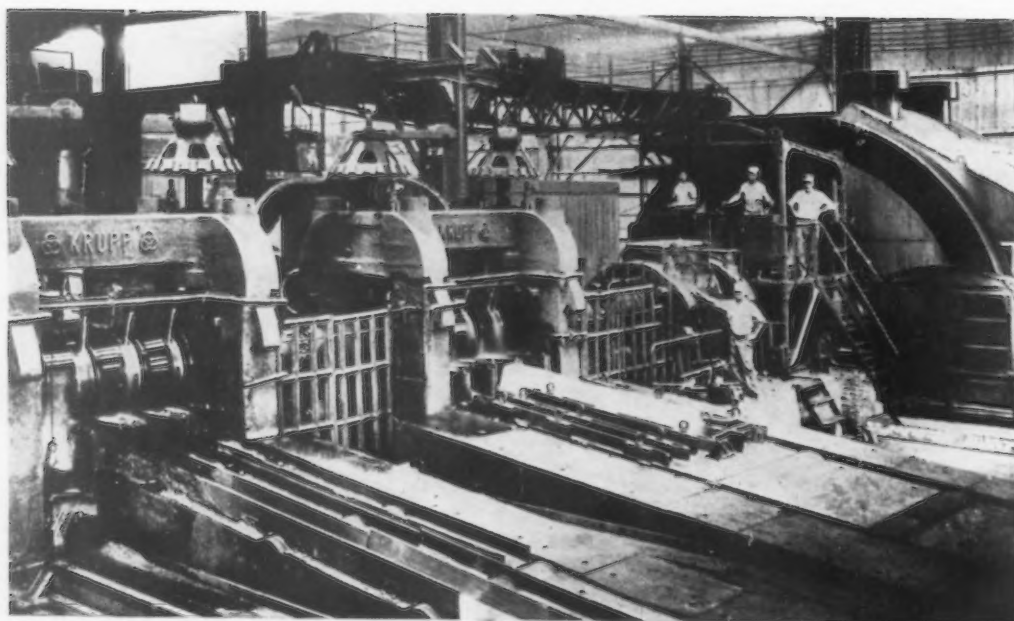
were not familiar with such a mill and its operation, it was estimated by the maker that it would have an initial capacity of about 600 tons a day in full operation, but in less than 10 weeks after installation, daily output reached 700 to 800 tons

of sheet bars 200 x 6 mm. (8 x 1/4 in.), and recently production has been 800 to 1000 tons daily, which is more than the rated capacity of the mill.

The installation consists of a two-stand, three-high blooming mill with rolls 750 mm. (29.52 in.) in diameter,

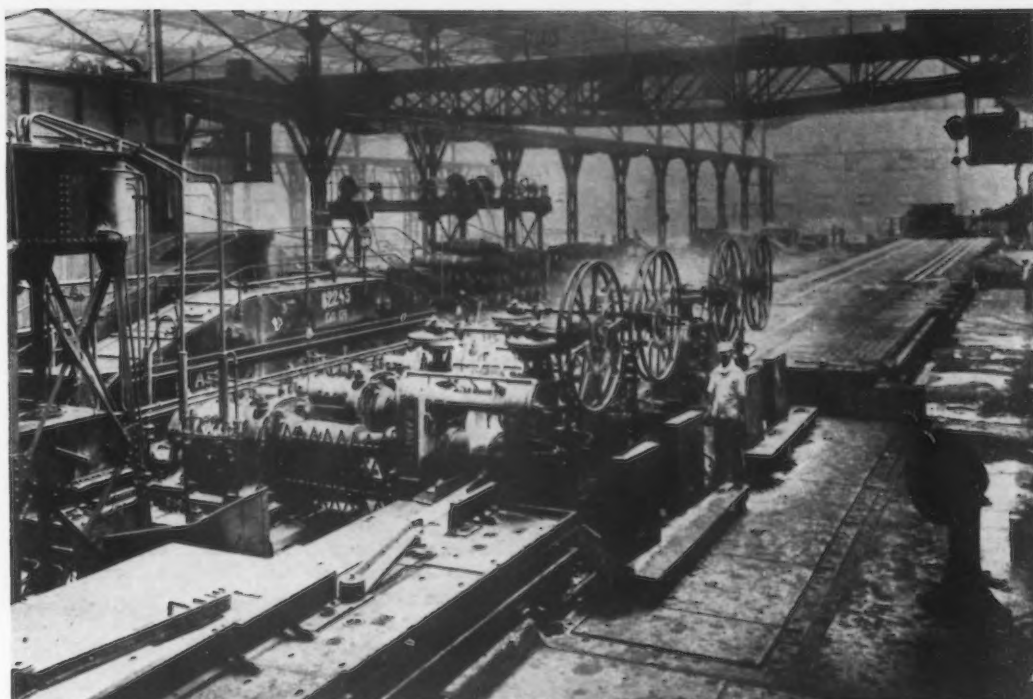


▲ ▲ ▲
TRANSFERRING
12½-in. ingots
from the furnace to
the ingot pusher for
first reduction in the
blooming mill. • Part
of the semi-continu-
ous production of
sheets at the Ka-
wasaki Dockyard Co.
in Kobe, Japan.



▼ ▼ ▼
TWO-STAND
blooming mill
where 1-ton ingots
are reduced to blooms
and sheared, ready
for the sheet-bar mill.

▲ ▲ ▲
FOUR-STAND continuous mill which breaks down the blooms into sheet bars.
 ▼ ▼ ▼



and a four-stand, continuous finishing mill with rolls 460 mm. (18.11 in.) in diameter. From the furnaces, the ingots are transported by electric monorail crane to ingot pushers, four of which have a total capacity of 35 tons. After passing through the first mill, the 1-ton blooms are sheared in half and move into the second mill,

where, following reduction to sheet bars, shears with a cutting length of 750 mm. (29.52 in.) permit cutting three bars at once. The sheet bars then drop to a conveyor and are automatically moved to the sheet mill. In 19 passes an ingot 320 mm. (12.57 in.) square is reduced to a sheet bar, 200 x 6 mm. (8 x 1/4 in.).

The few Japanese workmen trained in Germany prior to installation of the semi-continuous equipment in Japan showed unusual ability. The present mill has been so satisfactory in its operation that a similar installation is to be made by the Anzin Steel Co. in Manchuria, operated by the South Manchuria Railway Co.

Welder for Pipe-Line Work

DEMAND for higher speed in welding gas and oil-pipe line joints in the field has led to the development by the Westinghouse Electric & Mfg. Co., East Pittsburgh, of a 600-amp., FlexArc, single-operator, engine-driven welder for use with high-speed, high-current, large-size coated electrodes using high-voltage arcs. Application of the FlexArc principle also permits equally good operating characteristics and arc stability on the low-current ranges, with small electrodes. The machine is adapted also to rough and severe field service, where sustained loads and high currents are required over long periods.

The new unit provides welding currents up to 750 amp. for jobs encountered by pipe-line welding operators. The welding generator is of the variable-voltage, constant-current type, operating at 1450 r.p.m. The Westinghouse Flexactor is incorporated in the welding circuit, to eliminate current surges at the time of striking the arc and while welding. The main generator frame fits directly into the engine flywheel housing, making it possible to use a single-bearing flexibly coupled generator.

An over-size exciter is overhung from the main generator bracket, for

separately exciting the welding generator shunt field and for furnishing power. Separate excitation greatly increases the efficiency and simplifies welding current control. The generator control, consisting of a single-dial rheostat, ammeter and voltmeter, are all mounted on rear panel of set with a protective cover.

Driving power consists of a six-cylinder gasoline engine with an S.A.E. rating of 51.2 and 83 brake horsepower at 1450 r.p.m. This size has been selected by the manufacturer to provide sustained power and long life. The unit is equipped with a 25-gal. gasoline tank, Pierce governor, Eisemann magneto, large air cleaner, oil filter and protective radiator guard.

Reflecting a gain of 43 per cent, the value of stamped and enameled ware produced in 1929 by 579 establishments was \$174,879,957 as against \$122,275,976 produced in 1927 by 365 plants, according to the Bureau of the Census. The chief items in the 1929 total were stamped household ware, \$26,547,089; stamped automotive parts and accessories, \$30,041,640; other stamped ware, \$40,072,581; enameled ware (vitreous), \$32,302,045; bottle caps, \$29,923,420.

Prizes Offered for Best Designs for Bridges

Prizes aggregating \$1,700 are being offered by the American Institute of Steel Construction for the best design of a steel bridge. There will be two competitions, each having a first prize of \$500, a second of \$250 and a third of \$100, one going to engineering students and the other to architectural students. The first will be judged by a national jury of engineers and architects, and is open to any engineering student attending a school or college in the United States or Canada. The second will be held through the Beaux Arts Institute of Design.

The problem is a monumental bridge of restrained simplicity, such as would be erected over a navigable river within the corporate limits of a city of approximately 150,000 inhabitants. It would be 80 ft. wide, including two sidewalks of 10 ft. each, and a total length of 1770 ft. The approaches for a distance of 165 ft. would represent retaining walls and abutments. Night illumination would be provided for.

This is the third annual student competition held by the American Institute of Steel Construction.

Crystal Forms of Galvanizer's Dross and Zinc-Iron Alloys

By WALLACE G. IMHOFF*

IT is interesting to study more closely the crystal forms of the zinc-iron alloy, formed at higher temperatures. Fig. 14 shows a large number of these small crystals, collected and put under the microscope. They are seen to be made up of countless thin, hexagonal plates, which become smaller and smaller, thus forming the apex of the hexagonal pyramids. After a patient task of three hours one of these tiny crystals was got off by itself for inspection. Fig. 14 shows plainly the hexagonal pyramidal form of this zinc-iron alloy. It shows also the fine plates between the ends, very clearly.

Enough of these crystals were obtained, clear and free of any foreign material, for analysis. Their iron content was 8.94 per cent. This figure therefore causes us to reconsider all the figures given for zinc-iron alloy compositions in the literature, and in the accompanying chart.

Plotting Iron Content Against Temperature

It is possible from information available to construct a graph (Fig. 16) showing the chemical compositions of zinc-iron alloys at various temperatures. For example, some time

*Consultant in zinc coating (hot galvanizing), Vineland, N. J. This is the third and concluding portion of an article of which two sections have appeared.

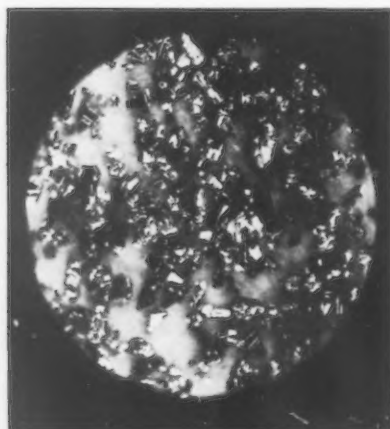


Fig. 14—Zinc-iron alloy crystals, made up of hexagonal plates which, when piled together, form the hexagonal pyramid. The fine, individual plates can be plainly seen. Magnified 36 diameters.

ago at the New Jersey Zinc Co. plant, Palmerton, Pa., it was brought out that zinc oxide was being made from galvanizer's dross in an electric furnace. A piece of the residue left was analyzed for iron content, and was found to contain 19.58 per cent. It smelled very strongly of calcium carbide when dissolved for the analysis, and there seemed to be a large amount of carbon left as residue.

The temperature of the electric arc is about 3600 deg. Fahr. Assuming this temperature at which the residue was left as one point, the iron content of the zinc-iron alloy crystals at 1500 deg. (8.94 per cent) as the next point, the iron content of 8.01 per cent in an alloy from the bottom of a pot destroyed in plant practice, and two others showing 6.27 per cent iron and 5.75 per cent iron content, Fig. 16 was constructed to show all the compositions of zinc-iron alloys. This, of course, refers to zinc-iron alloy compositions, and not galvanizer's dross, which contains a large part of the metal of the bath.

Using this graph as an actual composite of known zinc-iron alloys, the others at various temperatures may be found. Table II illustrates this point, although it may not represent actual facts.

The main source of error in Table II is, of course, in assuming that the temperature of 3600 deg. is correct for the alloy made in the electric furnace. According to the iron-zinc alloy equilibrium diagram shown in Fig. 17 this assumed temperature is entirely too high. The other features, however, which tend to strengthen this assumed temperature are the known iron-zinc alloys and temperatures on the lower end of the line.

It is admitted that the method is very crude, but it is not an easy matter to obtain these zinc-iron alloy crystals separately at each temperature so that they can be analyzed. The chart takes into account both the melt and the zinc-iron alloy crystals. Tests and analyses were made on crystals of the hexagonal, pyramidal type, made at the known temperature of 1500 deg. The others are only approximate, and therefore the entire results must be considered only approximate. The temperature might have been assumed at 2000 deg. Fahr.

instead of 3600 deg., but the points of the bottom of the line, which are pretty well known, do not then fit in so well.

Checking Theory Against Practice

Another point of extreme practical value is that I obtained in a plant some dross (zinc-iron alloy) crystals, exactly the same as those illustrated in Figs. 14 and 15. The conditions were pretty well known. The bottom of the pot was so hot that the kettle burned out in about 2 months. The dross was so dry that it was like sand, and the lumps could be crumbled in the hand. The dross made was nothing more than a mass of these zinc-iron alloy crystals of the pyramid form. The temperature at which they were made is estimated at 1500 to 2000 deg. These crystals are the same as those showing 8.94 per cent iron, made in the laboratory at 1500 deg.

Comparing the temperatures with those shown in the equilibrium diagram, Fig. 17, it is to be noted that both the melt and the crystals are considered, while the curve and temperatures herein discussed refer only to the zinc-iron alloy crystals without the melt. Also, the curve can be constructed from the known data of the four lower points: 5.75 per cent, 6.27 per cent, 8.01 per cent and 8.94 per cent, and then if the sample from the New Jersey Zinc Co. be considered

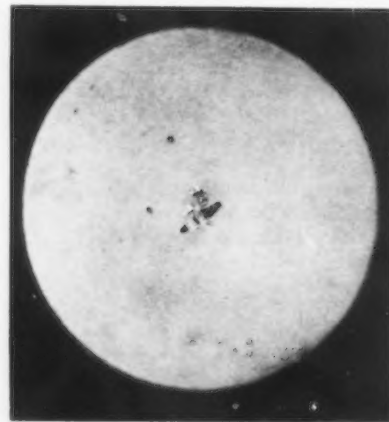


Fig. 15—An isolated, individual zinc-iron alloy crystal of the pyramid form. The plates are plainly to be seen in this crystal. Magnified 36 diameters.

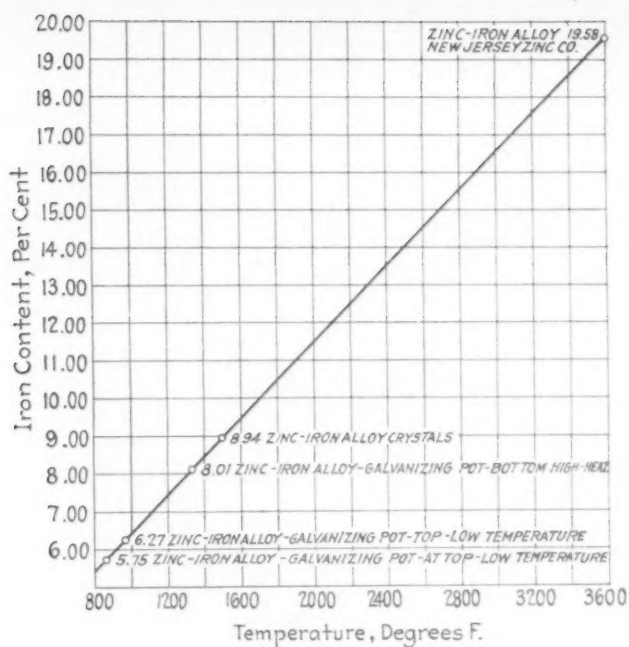


Fig. 16—Chemical composition of zinc-iron alloys.

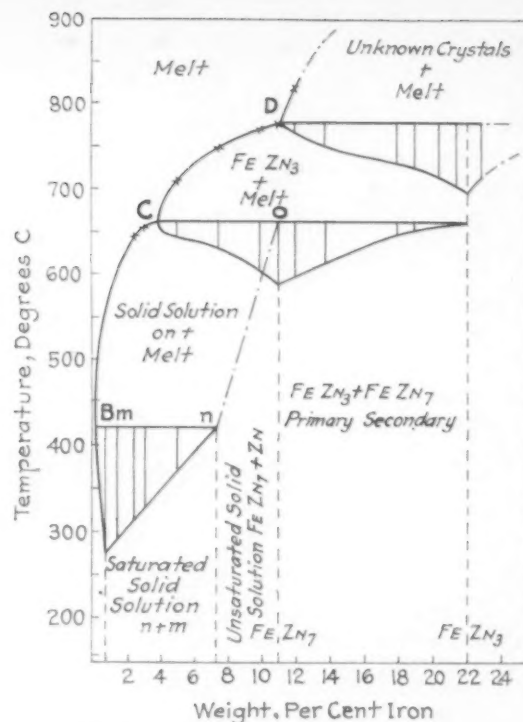


Fig. 17—Equilibrium diagram of iron-zinc alloy system.

as both melt and crystals (which was not so; it was mainly crystals), the crystals themselves, according to this graph, at 2000 deg., would have a chemical composition showing 11.50 per cent iron content, and the difference in iron value, 8.08 per cent, would have to be the iron content of the melt.

Since this diagram shows about 0.7 per cent iron in solid solution, and both Peirce and I have been able to detect the iron crystals in zinc as low as 0.025 to 0.035 per cent iron, it is possible that the temperature should be indicated a little higher. It must again be remembered, however, that the diagram refers to temperatures of both melt and crystals, while my results refer to the temperature for the zinc-iron alloy crystals alone, without any melt.

Summary of What Was Found

A complete summary of the results linking the theory of zinc-iron alloys with plant galvanizer's dross shows:

- 1.—Theory and practice agree closely in crystal form, chemical composition and temperature of formation.
- 2.—Both plant dross crystals and zinc-iron alloy crystals are rhombohedrons when formed under 900 deg.
- 3.—Both plant dross crystals and zinc-iron alloy crystals change their crystals from above 900 deg., and at 950 deg. show a definite crystal which can be recognized as a pyramid of the first order in the hexagonal system.
- 4.—The cross-sections of crystals under 900 deg. are rectangles, rhombs and parallelograms, while those above 900 deg. are hexagons.
- 5.—The dross and the crystals both lose zinc as the temperature is increased.
- 6.—From a practical standpoint this explains why "dross makes dross."

The dross crystals made at higher temperatures revert back into the dross crystals at lower temperatures and, in doing so, take up more zinc in chemical composition, thereby increasing the actual quantity of dross present.

7.—Due to the change in the crystal form in the dross crystal, the practical application of this knowledge can be had by using the crystal to show whether the pot and metal have been overheated. (A galvanizing bath should never for any reason be heated to a temperature above 900 deg.)

8.—The results herein found disclose what actually happens when galvanizer's dross is "sweated." The melt loses zinc, and the crystals change form at a higher temperature.

9.—The results show conclusively that "sweated" dross does not give

good metal, and such practice should be abandoned, since the metal changes back again when put in with good zinc, and makes more dross by changing back to the lower form of alloy crystal.

10.—It is not practical to heat dross to get the good metal out. Any operations to obtain zinc from dross should be so performed as merely to crowd the zinc-iron alloy crystals closer together at a low temperature; not over 850 deg.

11.—The crystals at a low temperature are long, slender needles, while at the higher temperature they are flat, six-sided plates.

12.—Raising the temperature above 900 deg. does not seem to affect the crystal form. Below 900 deg. the form is the rhombohedron; at all temperatures above 900 deg. the form is the hexagonal pyramid. This fact can be used in practice to check the temperature of the bath.

13.—As the temperature is raised above 900 deg., the chemical contents of the crystal change. In the rearrangement of the molecules the bond between the zinc and iron becomes stronger. Some zinc is lost, or dropped by the rearrangement, thus automatically increasing the relative iron content of the alloy.

14.—There is every indication that the bath will hold less iron in solid solution at a high temperature than it does at lower temperatures.

15.—By increasing the temperature the forces of crystallization are strengthened, and iron which will stay in solid solution at a low temperature is crystallized out in a definite zinc-iron alloy crystal at high temperatures.

16.—Due to this fact very small amounts of iron (0.025 to 0.035 per cent) may be detected in zinc by heat-

Table II—Possible Zinc-Iron Alloys. Constructed from actual known zinc-iron alloy crystals and some known temperatures

Temperature, Deg. Fahr.	Iron Content, Per Cent	Possible Zinc-Iron Alloys
800	5.40	
	5.4	Fe Zn 15
	5.8	Fe Zn 14
900	5.90	
	6.2	Fe Zn 13
1000	6.40	
	6.8	Fe Zn 12
1100	6.90	
	7.2	Fe Zn 11
1200	7.40	
	7.8	Fe Zn 10
1300	7.90	
1400	8.40	
	8.7	Fe Zn 9
1500	8.90	
	9.7	Fe Zn 8
	10.9	Fe Zn 7
2000	11.50	
	12.5	Fe Zn 6
2500	14.00	
	14.7	Fe Zn 5
3000	16.50	
	17.7	Fe Zn 4
3600	19.58	
	22.30	Fe Zn 3

ing the zinc above 900 deg. If there is any iron present it can quickly be detected at higher temperatures by the form of the zinc-iron alloy crystals.

17.—Even the smallest amount of iron can be detected, since the forces of crystallization are so strong that they form the outline of the crystal first, and fill in the rest of the crystal afterward.

18.—As the temperature is raised,

the crystals increase in size when undisturbed in cooling.

19.—While an iron per cent in zinc of 0.025 can be detected at high temperature, still at galvanizing temperatures (below 900 deg.), the bath usually takes up about 0.1 per cent of iron before the crystals separate out to form dross. This usually takes two to three weeks with a new pot, and proves that the bath holds more iron in solid solution at a low temperature

than at a high temperature. This fact is exactly the opposite from the beliefs of most investigators.

20.—The results of these investigations would seem to indicate that such alloys as Fe Zn₂, Fe Zn₃, and possibly Fe Zn₄, are not present in ordinary galvanized coatings as supposed, but they are rather zinc-iron alloys which are formed at much higher temperatures than are found in galvanizing baths.

New Type of Tank Overcomes Corrosion in Aluminum Welds

By A. EYLES

NOTWITHSTANDING the present extensive use of welded aluminum joints in tanks for airplanes, doubts are often expressed as to the reliability or permanency of joints fabricated by fusion welding. In fact, considerable prejudice, in both commercial and military circles, has existed against the use of aluminum tanks for storage of oil and gasoline in heavier-than-air aircraft.

Experience has shown that tanks made in this material frequently have suffered from corrosion which could not be detected from the outside until actual perforation occurred. It has, therefore, become fairly general to make such tanks of thin, tinned steel sheet, strongly riveted and soldered at the joints and seams. The resultant weight of this tank is approximately three times the weight which it is possible to obtain by fabricating the lighter metal.

Trouble Occurs at Welded Seams

Observation of aluminum tanks shows that the corrosion usually begins at the welded joints or seams. It has been found that welds which can be hammered and polished on both sides are as free from corrosion as a piece of plain aluminum sheet or plate. It is only owing to the fact that, in the case of an aluminum tank as generally constructed, it is impossible effectively to hammer and burnish the welds internally that corrosion occurs.

The new-type tank has been specially designed so that not only the welds but the complete internal surface of the tank can be burnished, and the welds can be hammered as freely as is possible on the external surface of the tanks. This result is achieved by making the aluminum tanks in two parts, in such a manner that each part of the tank is fully open at one end across its whole section. Thus ready access is obtainable for hammering up and polishing the internal surface.

Tanks so made have their parts fastened together by a patented form of joint, enabling the two parts to be disassembled for inspection and cleansing at the annual overhaul and

assembled again without injury or modification to the structure of the tank. So readily is this operation performed that it has been found possible in the case of a tank holding 250 gal. to part, inspect and clean, and reassemble the tank ready for testing, in little over one hour.

Tested Far Beyond Requirements

Usual airworthiness requirements for test pressures in aluminum tanks of the capacity referred to do not generally exceed 5 lb. to the square inch. But to determine, if possible, the maximum load which such a joint would stand, irrespective of the strength of the tank itself, a special tank was constructed, and by means of reinforcements was strengthened sufficiently to enable the joint to be tested to 20 lb. to the square inch. At this pressure no signs of leakage occurred. No attempt was made on this occasion to carry the test to destruction, as it was felt that the results achieved were already so far

in excess of requirements that a useless wastage of material would result from destruction of the tank.

In appearance, the round type of tank looks as though it consisted of two pans put together and secured by their flanges with a series of bolts and slotted sleeves, which maintain an even and regular pressure and, with packing between the flanges, make the joint leakproof.

With regard to weights, a tank complete with joint and bosses for fittings can be produced on this system for a weight varying between 0.20 and 0.25 lb. per gal., provided the design permits a reasonably efficient shape of tank to be employed. The new-type gasoline or oil tank is no more costly in production, and is particularly easy to clean out. Tanks embodying this new principle of design are built by Vickers (Aviation) Limited, Weybridge, England. B. N. Wallis, chief designer of structures for the company, is the inventor of the patented joint.

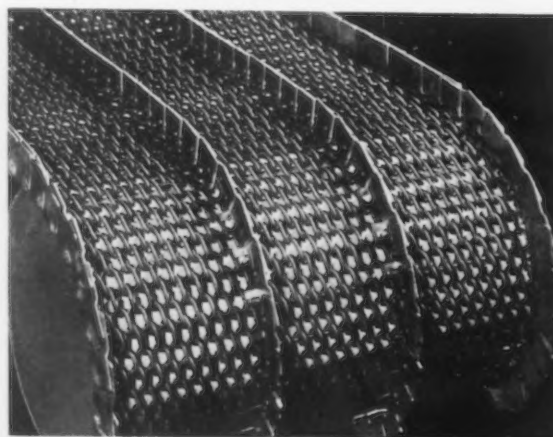
Flexible Side Guards and Belt Dividers

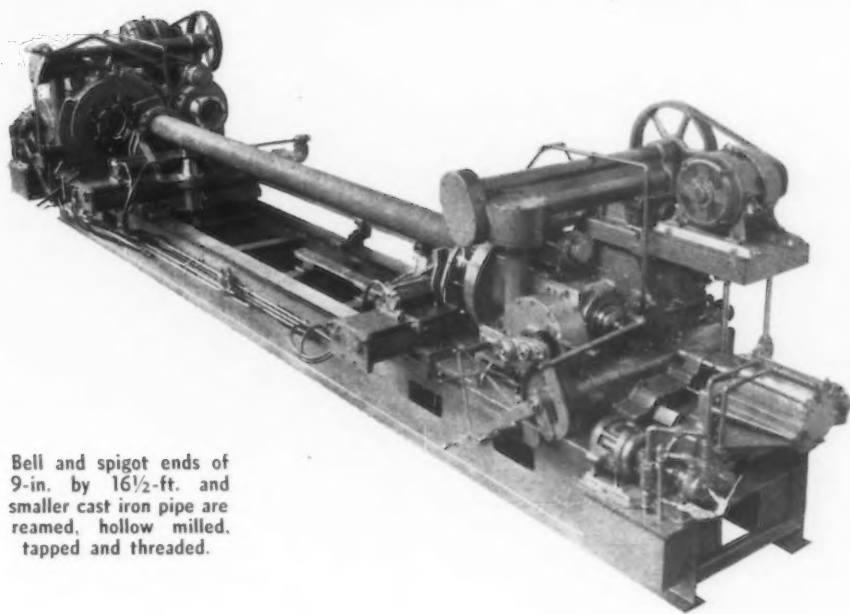
SEPARATION of a flexible wire conveyor belt, carrying parts through a manufacturing process, into two or more channels may be effected by special dividers provided by Wick-

wire Spencer Steel Co., Buffalo. At the same time a flexible flange, known as Flex-edge, prevents material from falling off the edges of the belt.

These dividers provide the same service as would be obtained through the use of individual belts. They may be spaced, across the width of the belt, at any distances desired, and allow for segregation of materials passing through the furnace.

It will be noted from the illustration the dividers and the Flex-edge are similar in construction. They are designed for easy attachment to the belt, thus facilitating both application and maintenance.





Bell and spigot ends of 9-in. by 16 1/2-ft. and smaller cast iron pipe are reamed, hollow milled, tapped and threaded.

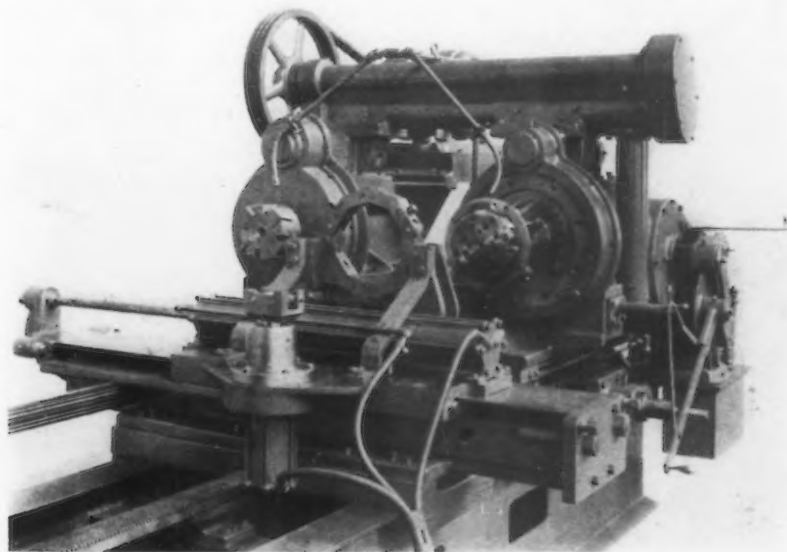
Special Equipment for Machining Cast Iron Gas Pipe

THE Moline Tool Co., Moline, Ill., has recently completed a special machine that will ream, hollow mill, tap and thread the bell and spigot ends of cast-iron gas pipe that is to be screwed together rather than calked in the usual manner. The capacity is for pipe 5, 7 and 9 in. in diameter, 6 to 16 1/2 ft. in length.

The bed is built up of structural steel, two 20-in. H-beams, 28 1/2 ft. long, being tied together by short I-beams which are spaced 36 in. apart and welded in position. Necessary brackets and bearings were bolted to this structure before the entire unit

was machined, and the upper flanges of the beams were planed on top to give a machined surface on which the remainder of the machine was built.

Arrangement of the saddles which carry the spindle units may be seen in the illustrations. The left-hand saddle is located permanently on the bed and the right-hand saddle is adjustable to suit different lengths of pipe. The spindle units have quick traverse to the work derived from oil pump units at each end of the machine; the slow feed for cutting is obtained through gearing direct from the main drive. Each spindle unit and



The right-hand saddle of the machine shown above is adjustable to suit different lengths of cast-iron pipe. This view shows the arrangement of spindle units and work-holding fixture.

each traverse unit has its own motor.

Crossheads between the two spindle units carry the work-fixture, the pipe to be machined being held in a "cat-head." The traverse of the crossheads is controlled by air supplied from the regular shop line.

In operating the machine the two vertical cylinders, controlled by an air valve on the front end of the left-hand crosshead, are raised. The pipe is then lifted by crane or conveyor and dropped into the V-blocks on the ends of the pistons; it is then lowered into the cat-head and clamped.

Alongside the valve that controls the vertical travel there is another valve that controls the horizontal movement of the pipe and the fixture. The crossheads are brought up against a positive stop to locate the pipe in line with the two rear spindles, and then a hollow milling operation is performed on one end of the pipe and a boring operation at the other end. When these operations are completed the crossheads are moved to the front of the machine in line with the two front spindles; one end of the pipe is then threaded externally and the other end is threaded internally.

Oxy-Acetylene Process for Overland Pipe Line Welding

THE Lindeweld process of oxy-acetylene welding introduced recently by the Linde Air Products Co., 30 East Forty-second Street, New



Cold bend made on 20-in. diameter pipe line welded by Lindeweld process.

York, as part of its process service, is intended primarily for use in overland pipe line construction. Future developments, however, are expected to lead to other industrial applications.

Speed and economy are claimed. In welding pipe for oil and gas transmission the process is said to afford savings ranging from 30 to 60 per cent in the time required to make the weld, depending upon the size of pipe;

oxygen and acetylene consumption have also been reduced considerably. High strength welds being consistently obtainable, quality is not sacrificed to speed. Tensile tests made in the field are said to show that the welds invariably outpulled the pipe. Good ductility has also been shown in bend tests, the extent of the cold bending of the natural gas pipe line illustrated to fit the contour of the ter-

rain being pointed to as a good test of the strength and ductility of the welds.

The process depends essentially on a new method of blowpipe manipulation and upon the new Oxweld No. 24 Lindeweld process welding rod developed for this work. More than 300 miles of high pressure pipe welded by this process are now in the ground.

It will be noted that the rolling bead is produced in two operations, first, expanding followed by a second or rerolling operation. This has been found necessary in order to obtain the high narrow rolling bead preferred by drum manufacturers because of its great resistance to crushing. If this type of bead is not demanded the expanding unit can be used to form a regular expanded rolling bead, or the fourth unit can be used with suitable rolls to form a rolling bead of the standard rolled dimensions.

All adjustments for changing the machines from one size body shell to another are accessible.

The company is also offering a double-end heading unit for putting both heads into the bodies. This can be followed by the seaming of both heads to the bodies on a No. 310 horizontal duplex seamer. Feed can be provided so that bodies pass automatically through the complete line, maintaining a production of five drums a minute and requiring only three operators.

Automatic Machines Manufacture Five Steel Drums a Minute

THE first two units of a series of four automatic drum manufacturing machines have been completed by the Niagara Machine & Tool Works, Buffalo, N. Y.

With a capacity of No. 16 gage, these machines receive the steel drum bodies after they have been rolled to cylindrical shape and welded. Progressing through the set of four machines at a speed of 5 per min., the bodies are flanged, rolling bead expanded, rolling bead rerolled, and corrugated. They are fed automatically through the four machines and ejected when completed, only one operator, who lifts the drum bodies to the feeding mechanism, being required. Bodies ranging from 9½ to 24 in. in diameter and 14 to 42 in. long can be handled.

The units can be used separately or in combinations of two, three or four. When the four units are set up in a line, any unit except the first, or flanging unit, can be stopped without stopping the feed mechanism. Drum bodies will progress through the idle units the same as if the latter were functioning.

The machines work on both ends of the drum body at the same time. All motions, except rotation of rolls, are controlled by Oilgear-operated hydraulic cylinders. Individual motors operate the rolls. Feed is reciprocating, each unit having its own individual feed. The two slides that carry

the upper rolls have tapered pilot plates. As these slides come toward each other and enter the drum body, the latter is guided by the pilot plates and centered automatically. The pilot plates, due to their taper, round up body shells which have become dented or misshapen.

Electrolytic Pickling Removes Scale from Stainless and Other Steels

A SIMPLE and rapid electrolytic pickling process for removing oxide and scale of every grade and composition from carbon and alloy steel, producing a surface that is chemically clean and in proper condition for plating, galvanizing, enameling, painting, lacquering and machining, has been announced by the Hanson-Van Winkle-Munning Co., Matawan, N. J. The appearance of the pickled metal is very bright and unpickled areas and surface imperfections show up clearly.

The simplicity of this process, which is designated as the Hanson-Munning Bright Dip, lies in the fact that the solutions do not vary in density for any kind of work, current density and time of immersion being

the only variables. Each of these is easily controlled and varied only in exceptional cases. Briefly described, the process consists of treating steel first as a cathode in an acid bath, and then as an anode in a second bath (the Bright Dip), with a water rinse between.

The process is said to consume about 10 per cent of the time required in ordinary pickling, which usually ranges from 14 min. to 2 hr., depending upon the type and quantity of scale. The volume of solution required is about half that in ordinary pickling, and solutions are renewed infrequently; it has been found, for example, that the solution in the No. 1 tank can be used constantly for a week of 144 hr.,



This double-end flanging and corrugating machine is one of the automatic steel drum manufacturing units described above.

while that in the No. 2 tank can be used for a month. This compares with daily, and sometimes hourly, changes of ordinary pickling solutions. The same solution can be used on all classes of work.

Inhibitors are not necessary, the scale being so quickly attacked that the acids are not in contact with the metal long enough to cause an appreciable loss of metal. Practically no fumes are generated by the solution, and with corrosive vapors eliminated, the pickling room can be operated on the same basis as other departments in the plant.

Hydrogen embrittlement is said to be entirely absent, except in highly-tempered products of thin section, which class of work is also embrittled in ordinary pickling. Such embrittlement can be corrected, however, by boiling the piece in water for a few minutes or by baking in a moderately hot oven after pickling.

Savings in polishing and grinding time are claimed, the work being so thoroughly cleansed of deeply embedded oxide or scale that the surface can be cut down and polished more rapidly than after ordinary pickling. It is stated that in many cases one grinding operation may be eliminated entirely. Labor saving devices, both automatic and semi-automatic, can be applied, as in electroplating.

Lead Anodes Employed

Equipment consists of two lead- or rubber-lined steel pickling tanks, a cleaning tank, a neutralizing tank and two rinse tanks, one of which is of wood, unlined. A motor-generator set with panel board having a voltmeter, ammeter, field switch and field rheostat is recommended for the pickling tanks. Lead anodes are used.

Before pickling, all grease is removed from the work in an electrolytic caustic cleaning solution; this is necessary because the acid solution will not dissolve oils. The next step is a water rinse; this is followed by immersion of the work as cathode in bath No. 1, with current from 60 to 100 amp. per sq. ft., for a period long enough to reduce oxides and leave a black residue, composed principally of iron carbide. The work is then rinsed in water and immersed in bath No. 2 as anode, with current of 150 amp. per sq. ft., until all residue is thrown off and the surface of the metal is bright and chemically clean. It is then given a neutralizing dip in hot sodium carbonate solution, and finally rinsed in hot water.

Where the Process Cannot Be Used

Before outlining further the advantages claimed for the Bright Dip process, the materials on which it cannot be used to advantage should be noted. Such products are thin sheets, fine steel wire or strip steel of thin section, such as springs, hacksaw blades and other thin pieces in which temper plays an important part. In pickling steel sheets, the gage or thickness of which automatically

governs the amount of current which it will carry, thin material acts as a resistance. Certain drawn and other products having deep recesses from which the scale must be removed may require the use of inside anodes. Castings, gray iron, malleable or steel, cannot be treated to advantage by this process because the acid used will not attack the silica inclusions that form a heavy skin on the surface of sand castings. Wrought iron, also, is not susceptible to treatment; because of the slag inclusions this material does not present the smooth bright appearance after being processed.

Scale Removed Quickly

Black magnetic oxide of iron, Fe_3O_4 , the most difficult to remove in ordinary pickling solutions, is removed by the Bright Dip process in 3 to 5 min. If the coating is unusually heavy, however, removal of this scale will require a maximum of 6 min. in

the No. 1 bath and 2 min. in the No. 2 bath. The oxide Fe_2O_3 , usually very light in character, requires 2 min. or less for its removal; this compares with ordinary pickling time of 15 to 40 min.

The complicated oxides formed on stainless steel and rustless iron require immersion of 5 to 6 min. in bath No. 1 and from 1 to 2 min. in bath No. 2. It is stated that in ordinary pickling, removal of scale from stainless steels would require at least 30 min. in a dense pickle of complex character, which attacks the base metal violently, causing a high metal loss. Scale on high-silicon alloys is said to yield to the Bright Dip process, and chrome-vanadium and chrome-molybdenum alloy steel to yield to treatment as readily as do the stainless steels.

The process will be sold under an agreement with royalties based upon the solution capacity of the main pickling tanks employed.

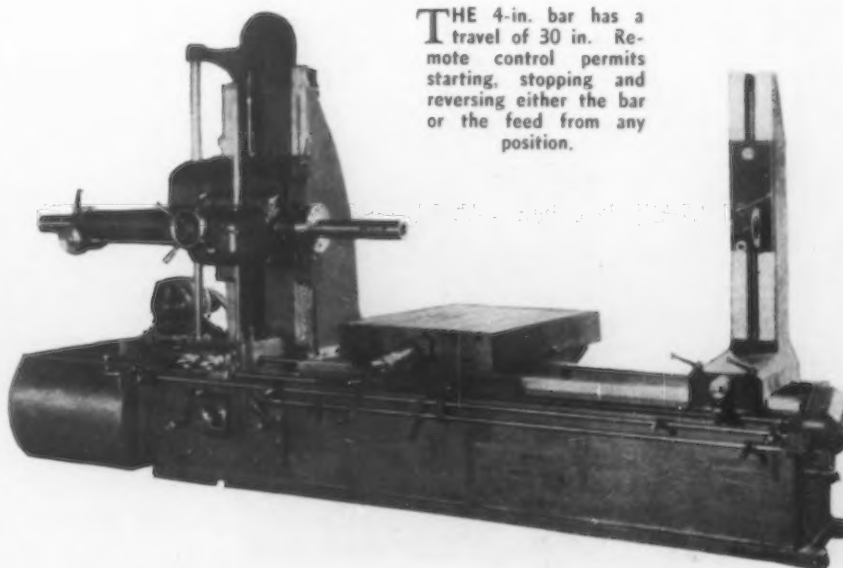
New Horizontal Boring Mill

THE Lambert Machine Tool Co., Bucyrus, Ohio, has brought out the horizontal boring mill here pictured, which has a 4-in. bar with a travel of 30 in.

The maximum distance from the faceplate to the outer support bearing is 84 in. The head has vertical power feeding movement of 30 in., the cross and longitudinal power feeding movements of the table are 40 in. and 60 in. respectively. Twenty-four feeds, ranging from 0.004 to 0.250 in. per revolution of the boring bar, are obtainable. The machine is also adapted for cutting right or left-hand threads in various pitches beginning with four threads per inch.

Either motor or belt drive may be

used without alterations. A multiple-disk clutch running in oil is placed between the motor and the transmission. The bar may be rotated in either direction at speeds varying from 7 to 216 r.p.m. Remote control permits the operator to start, stop or reverse either the boring bar or any of the feeding movements from every part of the machine. The milled lead-screws used are provided with large dials graduated in 0.001 in., and verniers are furnished for setting the head and the outer support bearing. Any feeding movement selected will remain constant independent of the speed of the bar. A $7\frac{1}{2}$ -hp. motor is required. The weight of the machine is approximately 16,000 lb.



THE 4-in. bar has a travel of 30 in. Remote control permits starting, stopping and reversing either the bar or the feed from any position.

Machine for Cylinder Block Distributor Holes

SIX operations on the distributor hole of an automobile cylinder block are performed by the six-spindle vertical machine illustrated, recently completed by the Davis & Thompson Co., Milwaukee. The machine drills two different size holes, spot faces two different sizes and fly-cuts and reams two different sizes. It has an indexing head, the indexing being automatic through an Oilgear pump and cylinder.

Each of the six spindles is mounted on Timken roller bearings. Spindle speeds can be changed for any desired operation and the feed is controlled by an Oilgear installation. This machine has rapid traverse to the work and a separate speed in relation to the cutters used.

The cylinder block is locked in place by means of air clamping, an air cylinder being located below the table as well as another one on top. Boring bars are piloted in a rotating ball-bearing guide in the table. After placing a cylinder block in this machine, the operator throws the lever shown at the left in the illustration;

the machine then performs the six operations and stops.

The indexing mechanism, a feature of the machine, is guided on the front end of the machine by a yoke which passes around the indexing head. The guide is a block that is hardened and ground to assure accurate indexing.

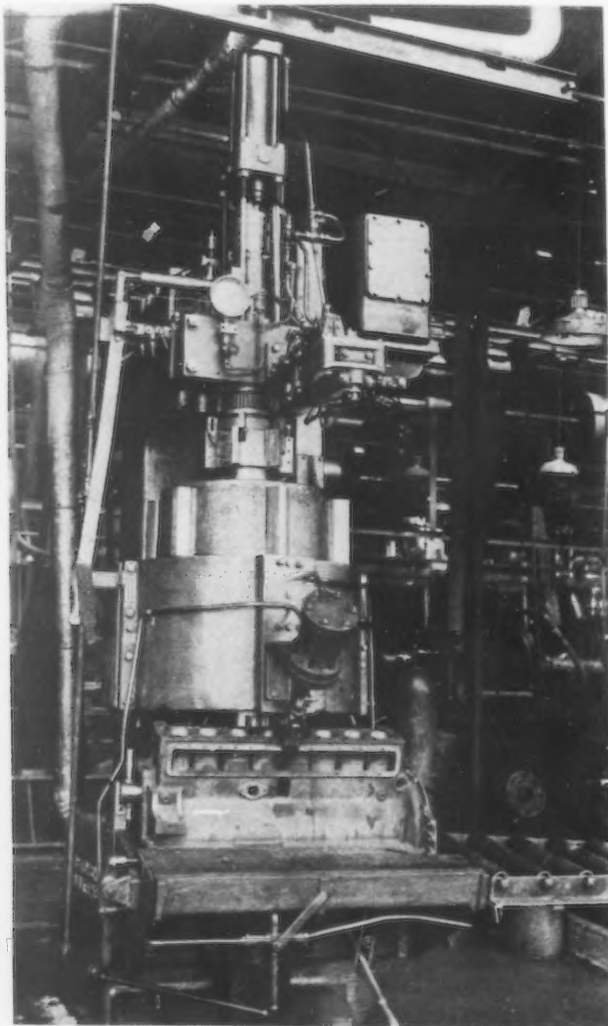
Testing and Sorting Gage for Springs

TO measure the compression of coil valve and other springs, in efforts to assure uniformity in compression, an automatic compression spring testing and selecting gage has been brought out by Toledo Precision Devices, Inc., subsidiary of the Toledo Scale Co., Toledo, Ohio. The springs are dropped in sockets in a disk, which is intermittently rotated, carrying each spring beneath a plunger, which descends and compresses the spring to a pre-determined length. The expansive force exerted by each

spring when compressed is automatically indicated in pounds on a large dial.

All springs after compression are discharged through a swinging chute that automatically moves to one of three positions and discharges the spring into the proper bin. Those of proper stiffness drop into one bin, those too stiff into another and those not stiff enough into a third bin.

The gage may be set to compress and test springs of different length



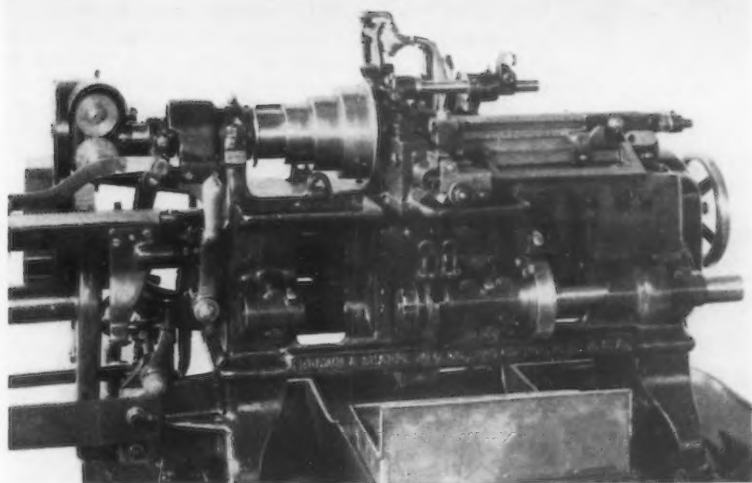
AFTER being tested on the machine at right, the spring is discharged into one of the three bins, according to its stiffness.



and different degrees of stiffness, and to sort them within any desired tolerance. For example, it may be adjusted to compress valve springs to a length of $2\frac{1}{2}$ in. and to drop into one bin all springs exerting between 35 and 40 lb. of expansive force when so compressed, those showing less or more than that range in expansive force being discharged into the other two bins. The machine can be adjusted to make the tolerance as close as desired, or as low as 4 oz.

OPERATIONS on the six-spindle machine at left are drilling, spot facing, fly-cutting and reaming cylinder block distributor holes. The automatic indexing head is a feature.

An investigation of lubricating oils from the standpoint of the importance of the manufacturing process on the resulting product has been made by the Bureau of Business Research of New York University. A questionnaire was instituted and the pamphlet reports, two in number, contain the views in extenso of automotive and industrial engineers consulted. Presumably a copy of the pamphlets may be had for the asking.



Feed and Timing Mechanism for B. & S. Screw Machines

ON jobs requiring pieces of considerable length the roller feed and timing mechanism recently brought out by the Brown & Sharpe Mfg. Co., Providence, for use on its automatic screw machines saves much time. One operation of the roller feed being sufficient to feed the piece the required distance, the multiple feedings with feeding fingers, otherwise necessary, are eliminated. The end of each new bar is positioned at a point that permits trimming to remove the waste, leaving only a suitable amount for chucking at the last end.

To determine the position for trimming, a swing stop with control mechanism is used. This stop functions only once to each new bar. Oper-

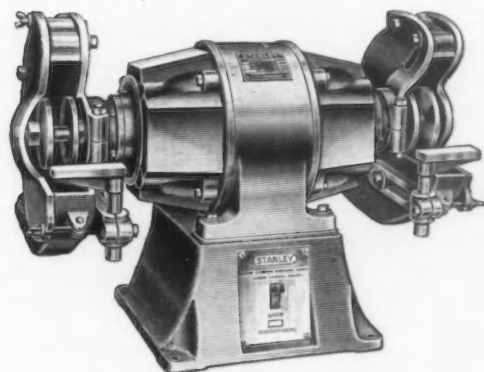
ation of the swing stop is controlled by a ratchet wheel actuated by a pawl which is moved by the rear cross-slide each time a piece of work is cut off. The number of teeth in the ratchet wheel is a multiple of the number of pieces available in each 10-ft. bar. As an example, a ratchet has 44 teeth, and as 11 pieces are contained in each bar, four operating dogs are necessary. These dogs are mounted on the side of the ratchet wheel and when positioned they allow the swing stop mechanism to function.

When the trimming operation is completed, the bar is again fed to the stock stop which determines the correct length of each piece available in the bar.

10-In. Motor-Driven Bench and Pedestal Grinders

TEN-INCH motor-driven grinders in two sizes, $\frac{3}{4}$ and 1 hp., and in both bench and pedestal styles, have been added to the line of the Stanley Electric Tool Co., New Britain, Conn. The machines have exhaust type wheel guards with adjustable shields for closing the gap between the guard and the

wheel as the latter wears. The motors are of ball-bearing type and are entirely inclosed to prevent entrance of grit and dust. Toggle switch, adjustable tool rests and conduit box are regular equipment; a starting rheostat is furnished on direct current grinders. The $\frac{3}{4}$ -hp. grinder, recommended



BOTH the bench and pedestal type grinders have fully-inclosed ball-bearing motors. Two sizes, $\frac{3}{4}$ and 1 hp., are made.

for continuous service, operates at 1725 r.p.m. on 30 to 60 cycles, 1425 r.p.m. on 25 and 50 cycles and 2100 r.p.m. on direct current. The wheel is 1 in. thick and has a $\frac{3}{4}$ -in. arbor hole. The distance between wheels is $14\frac{1}{2}$ in., while the length overall is 20 in. The base size is 10 x 11 in. The height of the machine is 15 in. and weight 153 lb. The 10-in. $\frac{3}{4}$ -hp. pedestal grinder has a cast iron pedestal equipped with shelf and water pot. The starting switch is located in the pedestal. The base measures 14 x 15 in. The height of the machine is 45 in.; the weight is 250 lb.

The 1-hp. machine is a heavy-duty unit for continuous service. The speeds are the same as those of the $\frac{3}{4}$ -hp. grinder, but the wheels are $1\frac{1}{4}$ in. thick and have a $\frac{3}{4}$ -in. hole. The distance between wheels is 20 in., while the length is 26 in. overall. The bench model is 17 in. high and the pedestal grinder 46 in. high. The weight of the bench machine is 183 lb. and that of the pedestal model 277 lb.

New Device Facilitates Checking Round Pieces

ROUNDNESS and size of pistons, bushings, sleeves, pins and other pieces ranging from $\frac{3}{4}$ to 6 in. in diameter may be checked rapidly by the direct reading indicator being



Pieces ranging from $\frac{3}{4}$ to 6 in. may be checked. Readings are to 0.0005 in.

announced by the Automotive Maintenance Machinery Co., 816 West Washington Boulevard, Chicago.

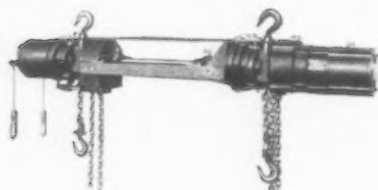
This device, named the Round-O-Meter, gives accurate readings to 0.0005 in. Requiring no skill to operate, the indicator permits unskilled operators to do precision inspection work without training in reading micrometers. By using the company's gage setting rings the device can also be used for direct measurement and comparative checking. These rings can be furnished in any specified diameters, oversizes or undersizes, within the range of $\frac{3}{4}$ to 6 in. inclusive.

Bunting Brass & Bronze Co., Toledo, has appointed 18 additional mill supply houses in various sections of the country as distributors for Bunting Phosphor Bronze cored and solid bars of bearing metal.

Twin-Hook and Low Headroom Electric Hoists

A TWIN-HOOK electric chain hoist and a new wire rope hoist for use where headroom is limited, have been placed on the market by the Chisholm-Moore Hoist Corp., Tonawanda, N. Y.

The twin-hook unit is for handling bulky loads such as bar steel, lumber, and automobile bodies, and is made in capacities ranging from $\frac{1}{2}$ to 3 tons,



The twin-hook hoist, above, is for bulky loads. The distance between load chains varies from 3 to 15 ft. The limited headroom wire rope hoist is shown below.



inclusive. Distance between load chains varies from 3 ft. to 15 ft., depending upon the particular handling job. Containers may be attached to the hoist frame for holding the slack chain, thus keeping the chain from touching the object lifted. Safety limits stop the operation of the hoist when the hooks reach either the highest or the lowest position, and a magnetic brake that acts instantly with the shutting off of the current serves to prevent drifting of the load.

Each hoist mechanism is equipped with eight ball bearings and four self-retaining roller bearings, and operates in a grease bath in a dust-proof, oil-tight frame. The controller is of drum type, single-speed; it is operated by pendant rope, but a push-button control is also available. Electric-welded "Inswell" load chain is used.

Hoist for Limited Headroom Conditions

The wire-rope electric hoist, also illustrated, can be utilized under extremely low headroom conditions, the $\frac{1}{4}$ -ton capacity hoist measuring only 13 in. deep from bottom of runway beam to bearing point of lower hoisting hook.

This hoist, named the Hi-Up, is of simple design, with all parts acces-

sible. It is supplied either with lug suspension for stationary mounting or with ball-bearing push-type trolley. Push-button control is standard. Rotating parts are mounted on Hyatt roller bearings and run in grease. As in the twin-hook hoist, the ball-bearing electric motor is fully enclosed. A magnetic brake is also provided in this unit.

Interchangeable Heating Element Developed

A NEW electrical heating element of immersion type has been developed by the Harold E. Trent Co., 439 North Twelfth Street, Philadelphia. Although the new unit is built on different principles, it is interchangeable with the company's other heating elements.

Insulation is of refractories graded in the course of manufacture to permit of a maximum temperature with high dielectric characteristics. The heating element is designed for correct relationship between its area and the outside casing, investigation having suggested that one of the causes of high mortality in heating elements is too small heating surfaces to radiate the heat generated. As a result, when the heating element is working on too high wattage per sq. in., it cannot dissipate the energy developed in itself.

For convenience and economy, the unit has been designed so that the element may be replaced in the casing. Failure from any cause, change in requirements to either higher or lower wattage or voltage, or from one to three heats may be met by placing a new element in the same casing. It is manufactured for stock purposes



Immersion-type electric heating element

with a seamless brass tube for casing, but bodies of copper, steel, or chrome alloy steel are furnished to meet certain requirements. While the heat in standard elements is distributed over the entire length of the unit, concentration of heat at various points along the tube can be provided.

Inserted Tooth Metal-Cutting Saw Features Draw Cut

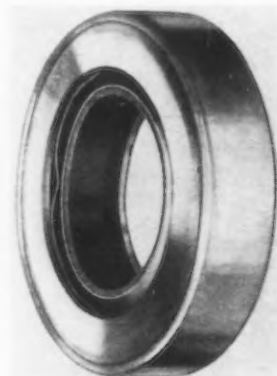
A NEW type of inserted-tooth circular metal-cutting saw designed to make a draw cut instead of a thrust cut has been introduced by Henry Disston & Sons, Inc., Philadelphia.



This saw, for general work, named the Improved Interlocked, is made in a number of sizes, with various spacings of teeth. The teeth are set in the blade at an angle which brings the cutting edge of the tooth on the radial line, so that the tooth is drawn or pulled through the metal instead of being pushed through it. This principle, for which patents are pending, is said to permit easier, smoother and quicker cutting; furthermore, when the teeth hit hard or soft spots in the metal they do not hog in or dig into the work, but relieve themselves and continue to cut smoothly. The saw is said to have proved particularly effective in cutting large rounds and sections.

Oil Seal for Both High and Low-Speed Application

A PRECISION oil seal for both low and high speed application is being put on the market by Gits Brothers Mfg. Co., 1940 South Kilborn Avenue, Chicago. This seal has accurate outside diameters, and works equally well with ball, roller or plain sleeve bearing inclosures. It is de-



Oil seal for both anti-friction and plain bearing inclosures.

signed to work with minimum friction for high speed. The seals are pressed from heavy metal and are accurately formed to insure an oil-tight joint when fitted to bearing housings. They are furnished in completely assembled units for shaft sizes ranging from $\frac{7}{16}$ to 6-in.

Lessening Evaporation and Hazard in Gas Tanks

A SMALL floating deck designed for minimizing evaporation losses and fire hazards in vertical, cylindrical gasoline storage tanks under 20 ft. in diameter has been developed by the Columbian Steel Tank Co., Kansas City.

It is simply an airtight float 8 in. high which rides on the surface of the liquid in storage. Around the rim of the float are tight-fitting strips of asbestos fiber, which form a close contact with the tank shell and make an almost airtight seal. Several installations have been made.

Index Shows That Recovery Is Approaching

BY LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

FAVORABLE FACTORS

1. Unfilled orders of the Steel Corporation increased more than seasonally in November.
2. The P-V line has recently taken a slightly rising trend.
3. Railroad freight car loadings in the past few weeks have held better than formerly.
4. The decline in building permits was checked in November.
5. Cotton cloth statistics continued moderately favorable in November, with a less than seasonal decrease in unfilled orders and increase in stocks.
6. Stocks of blister copper declined.
7. Progress in readjusting retail prices has been made.
8. On the average, industrial production has been sufficiently curtailed to insure the ultimate balance between supply and demand, and shortages "are in the making."
9. A fairly liquid mercantile position; moderate brokers' loans; low "money rates."

UNFAVORABLE FACTORS

1. Continued decline in commodity prices, including raw materials and pig iron.
2. The P-V line continues below normal.
3. Decline in foreign trade, both exports and imports.
4. A sharp drop in November employment and payrolls.
5. Continued decline in farm purchasing power.
6. Retail trade declined in November.
7. Machine tool orders at a new low.
8. Construction contract awards at a new low.
9. Large stocks of commodities, such as refined copper, lead and zinc.
10. Continued weakness in the bond market.
11. Frozen credit and bank failures.

IN comparison with a month ago the chief changes on the favorable side are the success of the United States Steel Corporation in increasing its unfilled orders, and the checking of the decline in car loadings and building permits. We may add signs of an approaching turn for the better in the statistical position of copper and zinc. A little rise in the P-V line is encouraging, but not for the immediate future.

On the unfavorable side, we note another decline in the prices of raw materials, including pig iron, silver and cotton; a very unfavorable showing in November exports and imports, after due allowance for seasonal variation; and large declines in employment and payrolls, building activity, and machine tool orders. The most striking development is the way in which frozen bank credit has come to a head in numerous bank failures, and continued liquidation in the bond market.

Both in number and weight, the unfavorable factors still are in the ascendant. Probably several months will be required to complete the process of liquidation and readjustment which should proceed in sustained recovery.

Final Phase of Recession Indicated

The P-V line somewhat resembles its position in early 1921. First, there came a prolonged decline in both commodity prices and physical volume, with prices falling the more rapidly, so that the P-V ratio declined. Now has come a stage in which the

concurrent declines of P and V continue, but V declines more than P, so that P over V rises.

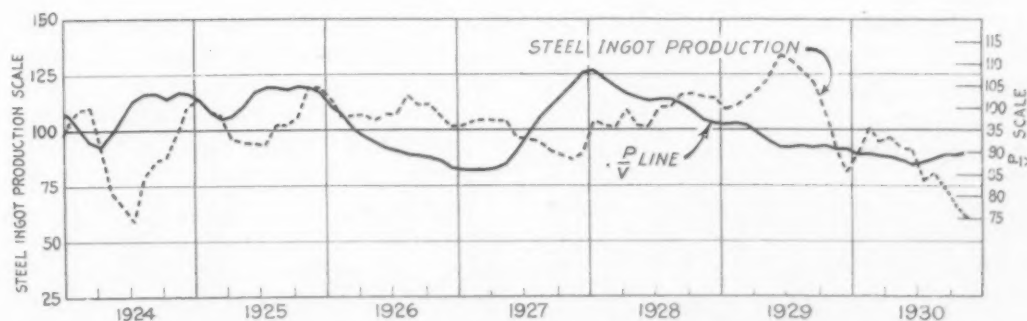
This marks the final phase of the recession. It indicates that the supplies of commodities coming to market are sufficiently reduced to approach an adjustment to the absorbing power of the market. The relation between intensity of demand (of the average buyer) and the supply pressure (from the average seller) is approaching equilibrium.

How long this phase may last it seems impossible to say—perhaps six months. Meanwhile, it is probable that there will be some further recession in physical volume and industrial activity, and it is not likely that the recession will be completed until after some such sensitive price index as Bradstreet's has turned upward.

Business Recovery After Ratio Reaches Normal

It is to be remembered that a normal level for the P-V ratio seems to exist and that, in the past, business has not recovered until this level has been reached by the barometer. The latter has not risen that far yet. It is also worth noting that if V (the physical volume) should increase as the result of a premature spurt, a relapse would probably occur.

As to steel, the P-V line suggests that the bottom of the production curve will be reached in a few months, but that no sustained recovery is likely until a month or two after the barometer line has risen above normal. Meanwhile, no sustained advance in steel prices is a normal expectation.



Slight gains in the P-V line (here plotted on 3-month moving average) indicates an approach to the date of probable business recovery. Readjustment is proceeding slowly.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

What of the Standard of Living?

IT is explaining the depression to say that the American standard of living is undergoing a severe test. We are far from willing to agree with Europe's intimation that we have carried the standard to unstable heights, but we might be willing to admit that the speed of its rise was unduly rapid, with the result that we have had to remain quiet to promote digestion.

What the American public may have been cajoled into buying, it proposes to keep. It must catch its breath before it resumes its upward march. Or, perhaps, better, expansive effort will be aimed at wider possession by a larger fraction of the people of those former luxuries so-called that have given the phrase scale of living a meaning of worldwide significance.

Installment selling established a huge reservoir that was finally filled eighteen months ago. It can hardly serve as a large continuing business incentive until new products of wide appeal are offered. Meanwhile deferred buying will have its largest place in keeping the reservoir full.

The coming months should bring answers to the standard of living question. At the moment we are engaged in an interesting experiment of attempting to maintain wage rates. In these tests employers have taken the lead and show a high social responsibility that betokens much for the greatly desired goal of industry—stabilization of prices, profits and employment.

The problem is complicated by the prospect of a flood of social legislation and by the fact that living costs are now tending downward. With any approach to normal activity, the buying power of wages will enhance. Then with unchanged rates we shall have the basis of actually lifting the status of living. If it holds, Europe will again begin sending delegations of investigation.

The attitude of promoters of large new enterprises will be a mighty deciding factor. If they believe that reasonable stability has been reached in costs, including labor, a rising volume of business would lighten the pressure against wage scales. Otherwise, the breaking down, as has occurred in instances in building construction, will spread by contagion into the mechanical engineering fields, notwithstanding wages in those were never boosted as in the highly organized industries. It is a nice question as to what reduction, if any, will net a sufficiently increased amount of work to develop higher total wage returns than exist with restricted employment at the prevailing rates.

Structural Steel and Cement

WITH so much talk about road making one would expect shipments of Portland cement to make a good showing, unless there is a decrease in other construction work that would offset. No decrease in building is shown by the records of fabricated structural steel work. Shipments of such structural steel by the fabricating shops in the first half of this year made a new high record, passing the first half of last year by 6.8 per cent. Portland cement shipments on the other hand decreased a fraction of one per cent. There are not exactly comparable figures to date, as the latest monthly fabricating figures report available goes only through October while the cement figures include November. Fabricated structural shipments in the four months after July 1 decreased 11 per cent while cement shipments in five months decreased the same amount, 11 per cent.

The divergent trend is perhaps the more curious from the fact that structural steel had had its best year in 1929 whereas cement had its best year in 1928, decreasing 3 per cent in 1929. Making the longer range comparison, then, by comparing the first ten months of 1928 and this year respectively, there was 7.8 per cent increase in fabricated structural steel shipments but 7.6 per cent decrease in cement shipments. The divergence, so to speak, is more than 15 per cent.

None of this divergence is to be explained on the ground of change in the character of fabricated structural steel work. As compared with 1928 this year is running more to bridges, viaducts, etc., requiring as a rule more cement per ton of steel than do buildings, and quite likely a survey would show an increase in concrete bridges.

Fabricated structural steel is certainly doing very well relative to cement. It is also doing well relative to steel in general. There was a certain relationship last year between total production of steel ingots and shipments of the fabricating shops. If the same relationship had existed this year, fabricated shipments in ten months would have been 2,140,000 tons, but they were 2,770,000 tons, or about 30 per cent more.

The fabricating industry is not running chiefly on momentum. References just made were only to shipments, and the bookings might not be in keeping, but the fact is that bookings have held up quite well. Through September of last year bookings exceeded shipments and it was stated that the large shops were booked for five or six months. Afterward the bookings averaged less than the shipments, but in the 13 months October to October inclusive bookings totaled 3,314,490 tons while shipments totaled 3,603,910 tons.

The apparent loss in order book in 13 months was 289,420 tons, the rate of loss in order book being about one month in 12, so that there should be a very fair order book left.

Coal Industry Hard to Help

At intervals there is talk that something ought to be done to help the coal industry. As human affairs go it seems improbable that anything will be done, seeing that the stronger movement of eight years ago came to naught. It will be recalled that following the great strike of 1922 Congress set up the United States Coal Commission, which presented a very exhaustive report, but no action followed. Public and congressional interest was much greater then than now, because the matter of union and non-union labor was involved, while now the bituminous industry is practically all non-union.

The Cleveland settlement of the 1922 strike involved a scale to run to April 1, 1923, and before it expired the commission asked the operators to renew for another year, to give the commission time to arrive at its findings. Nothing resulted and in 1924 there was the Jacksonville settlement, to run three years to April 1, 1927. That was the last union bituminous settlement of any importance.

It was supposed in those years of discussion that there were two alternatives: that the coal problem be settled by artificial aid, with action by Congress as to the anti-trust laws or otherwise, or that it be allowed to settle itself by the working out of hard if not cruel economic laws. The first failed and after all these years the second has not yet succeeded. Recent publication of statistics for 1929 prompt a review of the matter at this time.

There were "too many mines and too many miners." There are fewer miners now, not many more than enough, and they are poorly paid. In all these years the number of active mines has not greatly decreased. In 1913 there were 5766, in 1923, 9331, and in 1929, 6057. From 1923 to 1929 there was a decrease of 35 per cent in the number of active mines, but it must be noted that there was a decrease of 6 per cent in total output.

There has been quite a mortality among small mines, but the mortality extends far upward, there having been, according to the bare figures, a decreasing tendency even in the number of mines producing 200,000 to 500,000 tons per annum, but some of them may have graduated into the class of largest mines, those of a half million tons and over. The report of mines by classes shows the proportion of total production by mines of 100,000 tons and upward to have been as follows:

	Per Cent		Per Cent
1913	75.4	1927	77.1
1923	70.4	1928	80.1
1926	79.1	1929	83.1

Maximum capacity appears to have been in 1923. Assuming 308 working days to the year and available labor forces, 1923 capacity is given at 970,000,000 (net) tons, but in 1929 at only 752,000,000 tons. Many mines increased capacity, many disappeared completely, and others still in physical existence are out of the reckoning through not having produced

during 1929. Production in 1929 was 71 per cent of stated capacity. Output per man per day increased—1923 to 1929—from 4.47 tons only to 4.85 tons, but, with the average number of days idle reduced from 129 to 89, average output per man per annum increased from 801 tons to 1064 tons.

Of particular interest has been the contest between the Pittsburgh district, which, beginning in August, 1925, gradually worked into a non-union basis, and the "southern" fields of West Virginia and Kentucky. Of the total bituminous production, the Pittsburgh district furnished 7.5 per cent in 1923 and got down to 4.4 per cent in 1927, while it rose to 5.5 per cent in 1929. Fairmont has had little change, ranging between 4 and 5 per cent. Other West Virginia rose from 15.1 per cent in 1923 to between 21 and 22 per cent in the last two years. Eastern Kentucky rose from 6 per cent in 1923 to about 9 per cent in each of the last three years, while western Kentucky ran as follows: 1923, 1.9 per cent; 1927, 4.1 per cent; 1929, 2.6 per cent. The districts referred to totaled between 43 and 44 per cent of all production in the last three years.

CORRESPONDENCE

Lower Retail Prices

To the Editor: Last month I felt urged to write you, commending the accuracy of your editorial on page 1400 of the Nov. 13 issue, relative to building costs.

I have just read on page 788 of the Dec. 11 issue the letter from Mr. Walker, economist for R. H. Macy & Co., expressing his opinion that retail prices have responded to the deflation movement.

His letter reminds me of the fable concerning the two warriors who battled to death in an argument over a shield which proved to be gold on one side and silver on the other. Quite likely, Macy & Company have articles that they are retailing more cheaply today than some months ago. However, I will wager that the merchandise has been purposely cheapened correspondingly. I have visited numbers of stores and find that trademarked goods which I have been accustomed to buy for years have not been reduced at retail. On the other hand, I firmly believe that the retail stores have bought these articles from the manufacturer at a considerably lower price. I can mention two instances.

A traveling shoe salesman told me some days ago that he is today selling retailers a line of shoes which would enable the retailer to sell them at \$4.50 and make as much profit as he did when the shoes were retailed at \$5. However, he states that the retailers persist in retailing the shoes at \$4.95.

The other instance is that of a fruit dealer who is wholesaling trademarked oranges at \$2.50 per box less than formerly, but the retailers continue to retail the oranges at the old price.

This week I gazed at a topcoat in a haberdasher's window bearing a price tag in the same amount as the coat I wore, which was purchased three years ago.

Primarily, what prompts this letter is a lecture given here last night by Dr. Gus W. Dyer, professor of economics at Vanderbilt University, Nashville, Tenn., a printed excerpt of which I enclose. Note his statement

that no sane man would invest heavily at prosperity prices during a depression.

Relative to building, he thinks along the lines of your November editorial. He thinks millions would be spent for building if prices were down where the investor could build at 10 to 20 per cent below prosperity prices and be sure of a profit when prosperity comes back.

CHAS. A. FITZGERALD.

St. Louis.

Sells American Products Only

To the Editor: At this time when every one should be doing what they can to support domestic business with a view to helping out American trade and so to help solve the unemployment question, we believe that if jobbers and dealers insisted on selling only American goods it would be better for all concerned. We use the following on a rubber stamp on all our correspondence:

"Keep American industries running! We sell the product of American manufacturers only."

T. PARKER WOOD,

New York.

Secretary, A. P. Dienst Co., Inc.

Must Relearn Value of Thrift

To the Editor: Why have we disastrous unemployment, and at the same time abundant resources in raw materials, in man power and in manufacturing, transportation and distribution facilities, together with an apparent plethora of fluid capital, is the question posed in Col. Arthur Woods's talk, which is abstracted in your issue of Dec. 4. Many economists and others in addressing themselves to this riddle seem to have a blind spot for one cause of our present troubles, which lies right before their eyes and not hidden nor far away.

As Col. Woods states, and as every one agrees, there is in this country no present lack of means and materials to work with, but the difficulty is that those who would work cannot exchange their labor, or its product, for other things which they require; in other words, there is a dearth of buyers, the reason being that those who would buy lack both cash and credit. Now, as workers and wage-earners use the bulk of all consumers' goods, the lack of a market is to be looked for here.

However, the modern industrial worker himself consumes at most only a minute part of what he actually makes, or perhaps none at all, and the surplus must be exchanged for a great variety of articles which he requires. The self-sufficient farmer of pioneer days could accumulate goods in times of plenty for future consumption in times of scarcity and, to a certain extent, was able to direct his efforts to producing those things which he most needed.

As an equivalent course in the modern economic situation, the wage-earner should accumulate savings; in other words, requisitions payable upon demand, when times are good, work plentiful and prices high, and draw upon this accumulation, that is, command the product and labor of others as and when required, particularly when work is scarce, wages low and goods cheap. This, if generally practiced, would tend to level out the peaks of feverish over-activity and the valleys of economic depression.

But is this what our publicists have preached? Do not the majority, including many industrialists who should know better, shout insistently—"Buy, buy, buy, hand-to-mouth, on credit, luxuries, vanities, needless things, useless things, harmful things,—anything to keep up sales"?

Following this advice, and his own impulses, a vast number of individuals who are both producers and consumers have in recent years overdrawn their credit and are burdened with debt and so now can no longer buy even the necessities, thereby throwing out of employment those who might supply them and, reciprocally, being themselves

thrown out of employment. To talk about over-production of things for lack of which many are at the same time suffering is beside the point.

The diagnosis, however, may be easier than the cure, which would seem to call for lessons in the value of thrift. Such, it appears are rarely listened to in times of plenty when they could be applied most readily, but only under the compulsion of want. Thrift is a word of Icelandic and Scotch descent, and the Scotch seem to have it by heredity, thus, at the present juncture, turning the laugh on the rest of us.

GEORGE H. GIBSON

George H. Gibson Co.

New York.

Sodium Advocated as a Deoxidizer for Steel

USING sodium as a deoxidizer of steel is discussed by A. Glazunov in Rev. Univ. Min. for Oct. 1, 1930. The author concludes that sodium should be the best for these reasons: It does not dissolve in the bath; its oxide is completely insoluble in the bath; its melting point and that of its oxide are very low; the viscosity of its oxide is a minimum, and lastly its affinity for oxygen is great. He then refers to the difficulties in the use of sodium, due to its low specific gravity and low boiling point. His method of surmounting these difficulties is as follows:

About 50 g. of metallic sodium are placed in an iron cartridge containing sufficient lead to make the specific gravity of the whole about 8 (that is, greater than that of the steel by about one unit). The top of the cartridge is perforated, but atmospheric moisture is excluded by paraffin wax. In the molten metal the cartridge sinks to the bottom at once; the sodium volatilizes before the cartridge can melt and, issuing in 50 or 60 fine jets, penetrates the whole of the metal. There is a large surface for reaction, and the sodium oxide produced rises to the surface, leaving no trace behind. The lead is not soluble in molten iron, so that it has no ill effect; it is either vaporized or else forms a thin layer at the bottom.

Two cartridges are used per ton of steel, the addition being made in the ladle. There is a slight explosion when the cartridge sinks into the metal; a second one occurs only if the perforations are not large enough. Preliminary oxidation is carried out by ferromanganese or ferrosilicon, but not with aluminum, and it should not be pushed far enough to eliminate all oxygen from the steel. The results of tests carried out on mild (0.03 per cent carbon) and medium (0.60 per cent carbon) steel are recorded; comparative photomicrographs of steels produced without and with sodium indicate superior freedom from inclusions of the latter metal.

Metallurgical Value of Iron Ore Sinter

In order to get information on the metallurgical value of sinter, the North Central Experiment Station of the Bureau of Mines, Minneapolis, Minn., in cooperation with the University of Minnesota, is conducting a series of tests on the relative ease with which various sinters and various iron ores can be converted to metal by gas of the composition produced in the hearth of blast furnaces. Sinter is porous in structure, but its relative reducibility compared with iron ore is not known. It is generally assumed that sinter reduces very readily.

Steel Specifications for Shipment in January Gain

THE year-end holiday and inventory period, now at hand, will bring a further reduction in steel plant operations, in some cases amounting to complete suspension for several days. For the first half of the week, steel ingot output will average barely 35 per cent, compared with 38 per cent a week ago, but the irregularities in production between now and Jan. 5 may drive the figure below 25 per cent.

The decline in operations will be in line with expectations and has been discounted by the trade. Of greater present interest is a continued improvement in steel specifications for January shipment, pointing to an upturn in activity early in the new year. Releases in heavy hot-rolled products, in fact, have been heavier so far in December than in November for some mills, the gain for one important producer amounting to 30 per cent. Sheet and strip mills also are beginning to receive specifications for January delivery, although current shipping orders are receding sharply in tune with the year-end retrenchment of the automobile industry and other consuming lines.

RAILS, structural steel and tin plate are counted on for the most consistent support of mill operations in January, although replenishment of sharply deflated inventories should stimulate releases in virtually all finished products. Some measure of recovery from the unusually sharp curtailment in automobile manufacture is assured. The Rouge and Canadian plants of the Ford Motor Co. shut down Dec. 17, to remain inactive until Jan. 5, and December output of the industry in this country and the Dominion is now estimated at 100,000 to 110,000 cars, by far the lowest monthly output since 1921.

The Pennsylvania Railroad is in the market for 150,000 tons of rails, with an option on 50,000 tons additional. The New York Central will soon distribute orders for 170,000 tons of rails and on Dec. 29 will take bids on its general steel requirements for the first quarter. The Denver & Rio Grande Western has ordered 10,000 tons of rails, and the Louisville & Nashville, which last week contracted for 20,000 tons, will buy 35,000 tons more. While rail contracts are smaller than a year ago, holdover tonnage, both in the hands of roads and still unspecified, indicates that track-laying programs in 1931 will be fully as large, and possibly larger than in 1930.

The railroad equipment market is featured by a purchase of 50 locomotives by the New York Central and an inquiry for 1000 to 1200 steel hoppers cars from the Bessemer & Lake Erie.

Structural steel continues to show more activity than most other finished mill products. Fabricated steel awards, at 37,500 tons, include 17,000 tons for

two New York subway sections, while new projects, at 41,000 tons, embrace 17,700 tons for a Wabash Railway bridge over the Missouri River.

TIN plate output has risen to 55 per cent of capacity, but will be reduced temporarily during the holiday period. Pipe makers look for the placing of a number of new pipe line projects early in 1931. The contract for one large line, requiring 60,000 tons, may, in fact, be awarded within the next fortnight. In addition to new lines now in prospect, considerable tonnage will come from gathering lines and other auxiliary equipment required for large projects completed this year.

EXTENSIVE road building programs will be carried on by a number of States in 1931, and manufacturers of steam shovels report an increase in orders and inquiries. Farm equipment makers are showing more interest in their steel requirements, and Western railroad repair shops are taking an increasing tonnage of iron and steel bars.

A major buying movement seems to be developing in cast iron pipe, under the stimulus of winter prices.

FIRST quarter contracting in plates, shapes, bars and sheets has been in good volume. Most of the smaller buyers have covered their needs and the larger users who have not done so seem to be hesitating because of doubt as to the extent of their requirements, rather than because of price considerations. Price shading appears to be less prevalent than it has been for several months and buyers, in many cases, are as anxious as the mills for market stability. The leniency of producers of bars, plates and shapes in allowing customers to get under the wire at pre-advance prices is not without precedent, even in boom times.

Sales of billets, slabs and sheet bars at \$30, Youngstown, establish a decline of \$1 a ton. This is the first change in the price of these semi-finished products in several months and represents an adjustment to declines in the finished steel market.

Scrap markets are unusually sluggish, in line with the low rate of activity among steel producers, but several grades of old material have advanced in the St. Louis market, where dealers are building up stocks in anticipation of a betterment in demand.

Steel producers report improvement in foreign inquiries, but iron and steel exports in November, at 111,968 tons, declined to the lowest level to date for the year.

All three of THE IRON AGE composite prices remain unchanged—pig iron at \$15.90 a gross ton, finished steel at 2.121c. a lb. and heavy melting scrap at \$11.25 a gross ton.

PITTSBURGH

January Shipments of Steel Promise Gain— Railroad Needs Attracting Interest

PITTSBURGH, Dec. 22.—Mills in this territory are beginning to receive specifications on material to be shipped after Jan. 1. While not in substantial volume as yet, such releases offer the first definite indication of improved steel tonnage after the first of the year, and sentiment in the industry is definitely improving in spite of the very low rate of current activity.

Forward contracting for the first quarter continues and is satisfactory, if judged by the number of orders placed, even though small consumers predominate. Nevertheless, larger users of steel who have not placed their forward commitments do not seem to be hesitating because of price uncertainty, but rather because they are still in considerable doubt as to the amount of their needs.

Price shading seems to be less prevalent than it has been for several months, and buyers of steel in many cases are cooperating with mills in trying to establish a stable price structure.

Among the principal consuming lines, the railroads are attracting the most current interest. The Pennsylvania has inquired for its 1931 rail requirements, totaling 200,000 tons, and the New York Central purchases will likely be announced before the end of the year. The Bessemer & Lake Erie has come into the market for 1000 freight cars, and the Baltimore & Ohio, which last week inquired for a tonnage of spikes, is now inquiring for tie plates. The Erie has also issued an inquiry for its track fastening requirements over the next quarter, and the carriers have indicated that their 1931 track-laying programs will get under way early in the year. For this reason the local rail mill is expected to increase production sharply during January, and naturally will contribute heavily to the district's steel production.

Sheet and strip mills are beginning to receive specifications from the automobile industry for shipment early in January, and schedules indicate a considerable improvement over those of December. Farm implement makers are also showing more interest in their steel requirements and are expected to place heavier tonnage in the next month. The jobbing trade is now occupied with inventory taking, but distributors, along with small manufacturers, are expected to fill out their stocks to some extent after inventory taking has revealed their absolute needs.

All in all, January now seems definitely to promise a moderate seasonal upturn in steel demand, although the

Despite low rate of current activity, steel trade is encouraged by fair bookings for January shipment.

* * *

Pennsylvania Railroad inquires for 200,000 tons of rails. Railroad needs in steel are center of interest.

* * *

Price shading less prevalent than in several months. Consumers, as well as mills, anxious for stable price structure.

* * *

Operations during remainder of month will be erratic, owing to holiday shutdowns.

* * *

Scrap market dull, but no further price changes of importance have occurred.

maintaining of this rising trend is still entirely problematical.

Steel mill operations this week have not declined as much as had been expected, particularly in the open-hearth departments. At several mills, steel-making capacity is being occupied through Wednesday, although complete suspensions were effective at some plants Saturday night. The latter condition was more pronounced among finishing mills. Activity will be resumed in some plants next week, although others will remain down until Jan. 5. Although it is difficult to arrive at any close estimate of steel-making activity during the holiday weeks, the average of Pittsburgh mills will not be above 30 per cent, while nearby districts are not running at this rate.

Tin plate production showed another gain last week, although many plants are taking advantage of the holiday this week for a complete suspension. Sheet mills also showed a slight gain in production in the past week preparatory to reducing running time over the holidays.

The pig iron market reflects a limited amount of consumer interest in forward requirements, although current shipments are seriously curtailed by inventory taking in foundries. The scrap market continues very dull, with recent activity confined to the blast furnace grades.

Pig Iron

The usual year-end lull has occurred in the pig iron market, and shipments last week were considerably lower than they had been in the first half of the month. A number of foundries are not operating and

will enter the new year with practically no pig iron on their yards. In the mean time, first quarter contracting continues in a limited way, but sizable inquiry is lacking. Some sellers believe large buyers may come into the market after the first of the year as contracting thus far has been confined principally to the smaller users. Only one merchant furnace is active in this district and none in the Valley. Steel companies, with large stocks of basic iron on their yards, are watching the market closely for possible inquiry, and a large tonnage would undoubtedly develop keen competition. No price irregularities are reported, but prices are being tested only on small sales.

Prices per gross ton, f.o.b. Valley furnace:

Basic	\$17.00
Bessemer	17.50
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.50
Low phos., copper free	\$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	\$17.50
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	18.00
Bessemer	18.00

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-Finished Steel

Sellers in this district still maintain silence regarding first quarter prices, but sales at \$30, Youngstown, for billets, slabs and sheet bars, have been made in the Valley, and local sellers could hardly demand more. Buyers of semi-finished steel in and near Pittsburgh seem to have material coming to them on old contracts, and, with consumption at such a low point, are showing no interest in future contracting. Contracts for forging billets have been made at \$36, Pittsburgh. Wire rods are holding at \$35, Pittsburgh or Cleveland, and users are entering their first quarter contracts.

Rails and Track Accessories

The Pennsylvania Railroad has entered the market for its 1931 requirements, 200,000 tons. Of this amount, 150,000 tons will be definitely bought at this time, with an option on 50,000 tons additional. This road's total purchases a year ago amounted to 310,000 tons. Inquiry for accessories will come out in a short time. Bids on the New York Central 1931 requirements will be opened Dec. 29. Pittsburgh interests will share heavily in both of these orders, and rail mill operations will be stepped up sharply soon after the first of the year. The new rail and structural mill of the Weirton Steel Co. will begin operat-

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Dec. 22, Dec. 16, Nov. 25, Dec. 23,					Dec. 22, Dec. 16, Nov. 25, Dec. 23,				
1930 1930 1930 1929					1930 1930 1930 1929				
Pig Iron, Per Gross Ton:					Finished Steel,				
					<i>Per Lb. to Large Buyers:</i>				
No. 2 fdy., Philadelphia.....	\$17.76	\$17.76	\$18.26	\$20.76	Sheets, black, No. 24, P'gh....	2.35	2.35	2.35	2.75
No. 2, Valley furnace.....	17.00	17.00	17.00	18.50	Sheets, black, No. 24, Chicago				
No. 2 Southern, Cin'ti.....	14.19	14.19	14.69	17.69	dist. mill.....	2.45	2.45	2.45	2.75
No. 2, Birmingham.....	14.00	14.00	14.00	14.50	Sheets, galv., No. 24, P'gh....	2.90	2.90	2.95	3.40
No. 2 foundry, Chicago*.....	17.50	17.50	17.50	20.00	Sheets, galv., No. 24, Chicago				
Basic, del'd eastern Pa.....	17.75	17.75	17.75	19.50	dist. mill.....	3.00	3.00	3.10	3.50
Basic, Valley furnace.....	17.00	17.00	17.00	18.50	Sheets, blue, No. 13, P'gh....	2.05	2.05	2.05	2.35
Valley Bessemer, del'd P'gh....	19.26	19.26	19.26	20.76	Sheets, blue, No. 13, Chicago				
Malleable, Chicago*.....	17.50	17.50	17.50	20.00	dist. mill.....	2.15	2.15	2.15	2.45
Malleable, Valley.....	17.50	17.50	17.50	19.00	Wire nails, Pittsburgh.....	1.90	1.90	1.90	2.40
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04	Wire nails, Chicago dist. mill.	1.95	1.95	2.00	2.45
Ferromanganese, furnace.....	80.00	80.00	94.00	100.00	Plain wire, Pittsburgh.....	2.20	2.20	2.30	2.40
					Plain wire, Chicago dist. mill.	2.25	2.25	2.35	2.45
					Barbed wire, galv., Pittsburgh	2.55	2.55	2.60	3.05
					Barbed wire, galv., Chicago				
					dist. mill.....	2.65	2.65	2.75	3.10
					Tin plate, 100 lb. box, P'gh....	\$5.00	\$5.00	\$5.00	\$5.35
Rails, Billets, etc., Per Gross Ton:					Old Material, Per Gross Ton:				
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00	Heavy melting steel, P'gh....	\$12.75	\$12.75	\$12.75	\$15.75
Light rails at mill.....	36.00	36.00	36.00	36.00	Heavy melting steel, Phila....	11.00	11.00	12.00	14.50
Rerolling billets, Pittsburgh...	30.00	31.00	31.00	34.00	Heavy melting steel, Ch'go....	10.00	10.00	10.00	12.50
Sheet bars, Pittsburgh.....	30.00	31.00	31.00	34.00	Carwheels, Chicago.....	11.75	11.75	11.75	13.75
Slabs, Pittsburgh.....	30.00	31.00	31.00	34.00	Carwheels, Philadelphia.....	14.00	14.00	14.00	15.50
Forging billets, Pittsburgh...	36.00	36.00	36.00	39.00	No. 1 cast, Pittsburgh.....	12.50	12.50	12.50	14.50
Wire rods, Pittsburgh.....	35.00	35.00	36.00	40.00	No. 1 cast, Philadelphia.....	12.00	12.00	12.00	15.00
	Cents	Cents	Cents	Cents	No. 1 cast, Ch'go (net ton)...	9.50	9.50	9.50	13.50
Skelp, grvd. steel, P'gh, lb....	1.60	1.60	1.60	1.85	No. 1 RR. wrot., Phila.....	13.50	13.50	13.50	15.50
					No. 1 RR. wrot., Ch'go (net)...	8.50	8.50	8.50	12.00
Finished Steel,					Coke, Connellsville,				
<i>Per Lb. to Large Buyers:</i>					<i>Per Net Ton at Oven:</i>				
Bars, Pittsburgh.....	1.60	1.60	1.60	1.90	Furnace coke, prompt.....	\$2.50	\$2.50	\$2.50	\$2.60
Bars, Chicago.....	1.70	1.70	1.70	2.00	Foundry coke, prompt.....	3.50	3.50	3.50	3.75
Bars, Cleveland.....	1.65	1.65	1.65	1.90					
Bars, New York.....	1.93	1.93	1.93	2.24	Metals,				
Tank plates, Pittsburgh.....	1.60	1.60	1.60	1.90	<i>Per Lb. to Large Buyers:</i>				
Tank plates, Chicago.....	1.70	1.70	1.70	2.00	Lake copper, New York.....	10.12 1/2	10.62 1/2	12.12 1/2	18.12 1/2
Tank plates, New York.....	1.88	1.88	1.88	2.17 1/2	Electrolytic copper, refinery...	10.00	9.75	10.25	17.75
Structural shapes, Pittsburgh...	1.60	1.60	1.60	1.90	Tin (Straits), New York.....	25.37 1/2	23.75	26.12 1/2	39.50
Structural shapes, Chicago...	1.70	1.70	1.70	2.00	Zinc, East St. Louis.....	4.05	4.00	4.10	5.45
Structural shapes, New York...	1.85 1/2	1.85 1/2	1.85 1/2	2.09 1/2	Zinc, New York.....	4.40	4.35	4.45	5.80
Cold-finished bars, Pittsburgh	2.00	2.00	2.00	2.30	Lead, St. Louis.....	4.95	4.95	4.95	6.10
Hot-rolled strips, Pittsburgh...	1.55	1.55	1.55	1.90	Lead, New York.....	5.10	5.10	5.10	6.25
Cold-rolled strips, Pittsburgh.	2.25	2.25	2.25	2.75	Antimony (Asiatic), N. Y....	7.10	7.10	7.15	8.37 1/2

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

ing on Dec. 29, but no rail bookings have been reported as yet. Shipments of track accessories are light and contracting is slow.

Bolts, Nuts and Rivets

December business has been approximately equal to November's, but shipments will be lighter between now and the first of the year. With the requirements of the automobile industry at a minimum, structural projects have been a principal outlet for rivets in recent weeks, although railroad buying of bolts and nuts has been a factor. Operations average 30 to 35 per cent of capacity.

Bars, Plates and Shapes

Mills are concentrating their attention on first quarter contracting, and a large percentage of the smaller users are now covered for the next three months. Opposition to higher prices is confined to the larger users of shapes and plates, but it now seems unlikely that much business will be booked at less than 1.60c., Pittsburgh, even by the most substantial buyers. Mills seem determined to maintain the recently named 1.65c., Pittsburgh, price on small tonnages, and current

orders and shipments against old lower priced contracts will be completed in the next week. Large tonnage projects will be delayed until after the first of the year in most cases, although bids will be taken Dec. 31 on 50 barges for the Government line which will require approximately 27,000 tons of plates. The New York Central is inquiring for its finished steel requirements for the first quarter and will take bids Dec. 29. Structural and reinforcing bar awards in this district have been light in the last few weeks, but the larger shops are still well occupied.

Cold-Finished Steel Bars

While makers have named no official first quarter price, contracts are being taken at 2c. to 2.10c., Pittsburgh, depending on the size of the buyer and the price which he had been paying recently. The market has never declined openly to 2c., although considerable tonnage has been taken at that figure. Shipments continue very light, with operations scarcely averaging 35 per cent of capacity. Improvement after the turn of the year is practically assured with heavier schedules in the automobile

industry and an almost certain increase in the production of farm implement manufacturers.

Tubular Goods

Pipe manufacturers are devoting considerable attention to prospects for early 1931. While new projects to be undertaken early in the year dominate the picture, considerable tonnage will also come from gathering lines and other auxiliary equipment required by the larger projects undertaken this year. This should develop business for the industry's smaller seamless and electric weld capacity. Standard pipe demand continues light, but compares favorably with the other types of pipe. Boiler tubes are in fair demand, and some railroad buying is developing. Mechanical tubing is very dull.

Wire Products

Current shipments to jobbers are light, with many of them now engaged in inventory taking. Considerable business is expected to develop in merchant wire products early in January as depleted stocks are rounded out. Buyers seem quite willing to contract for first quarter at

THE IRON AGE COMPOSITE PRICES

	Finished Steel	Pig Iron	Steel Scrap
Dec. 22, 1930	2.121c. a Lb.	\$15.90 a Gross Ton	\$11.25 a Gross Ton
One week ago	2.121c.	15.90	11.25
One month ago	2.135c.	16.11	11.58
One year ago	2.362c.	18.21	14.25
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.
	HIGH LOW	HIGH LOW	HIGH LOW
1930.....	2.362c., Jan. 7: 2.121c., Dec. 9	\$18.21, Jan. 7: \$15.90, Dec. 16	\$15.00, Feb. 18: \$11.42, Dec. 9
1929.....	2.412c., April 2: 2.362c., Oct. 29	18.71, May 14: 18.21, Dec. 17	17.58, Jan. 29: 14.08, Dec. 3
1928.....	2.391c., Dec. 11: 2.314c., Jan. 3	18.59, Nov. 27: 17.04, July 24	16.50, Dec. 31: 13.08, July 2
1927.....	2.453c., Jan. 4: 2.293c., Oct. 25	19.71, Jan. 4: 17.54, Nov. 1	15.25, Jan. 11: 13.08, Nov. 22
1926.....	2.453c., Jan. 5: 2.403c., May 18	21.54, Jan. 5: 19.46, July 13	17.25, Jan. 5: 14.00, June 1
1925.....	2.560c., Jan. 6: 2.396c., Aug. 18	22.50, Jan. 13: 18.96, July 7	20.83, Jan. 13: 15.08, May 5

recently established prices. Nails are holding much better than usual at \$1.90 and \$2 a keg. With the jobber's figure \$13 a ton under the average for the last 10 years, manufacturers are anxious to see advances made. Manufacturers' wire is quotable at 2.20c. to 2.30c., Pittsburgh, and spring wire at 3.30c.

Strip Steel

The smaller users of strip steel have entered their first quarter contracts in most cases, and market prices are well established on this class of business. Larger consumers are more reluctant to buy, but do not appear to expect concessions in price. January requirements of the automobile industry show considerable improvement over December's, and miscellaneous consumers of strip steel indicate a fair increase in consumption. Strip mill operations are negligible this week, but averaged 35 per cent on hot-rolled material and about 25 per cent on cold-rolled last week. Cold-rolled strip is well established at 2.25c., Pittsburgh, and hot-rolled at 1.55c. to 1.60c. for material 6 in. and wider and 1.65c. to 1.70c. on the narrower widths.

Tin Plate

Tin plate operations continued to gain last week, with the average for the industry not less than 55 per cent of capacity. Makers are operating chiefly on anticipated tonnage, and in some cases this material is now about ready to ship. Contracting for 1931 has now been largely completed. Mill schedules are sharply reduced this week because of the holiday, with no operations scheduled after Wednesday.

Sheets

Specifications for sheet steel to be delivered in January have increased and forward contracting continues at a fair rate. Smaller users have now generally entered their first quarter requirements, and larger consumers are evincing interest in the market as they estimate their needs for the next three months. Prices are still gaining strength, and recent minimum figures are now well established on the basis of first quarter purchases. On gal-

vanized material, the market is quoted at 2.90c. to 3c. On the other grades of sheets, minimum quotations are ruling in most cases, although enough business is being taken at \$1 and \$2 a ton over such levels to warrant a continuation of the price ranges. Mill operations increased slightly last week in anticipation of holiday week curtailment.

Coal and Coke

Continued cold weather is developing a better demand for domestic coal and coke, although the movement so far this season is considerably below normal. Producers' stocks are not large, and conditions are right for a satisfactory improvement in the next few weeks. Furnace coke is in light demand, with the price holding at \$2.50, Connellsville. A few sales have been made at less, but occasional business is also taken at as high as \$2.60. Shipments of foundry coke have declined to a minimum as many con-

sumers are inactive because of inventory taking.

Old Material

The scrap market continues very dull, with sales during the week confined principally to the blast furnace grades. Consumer purchases have been made at \$8, a decline of 50c. a ton from the last sale, and the market is quoted at a correspondingly lower level. Purchase of a tonnage of No. 1 heavy melting steel by a Pittsburgh district consumer at an increase over recent quotations cannot be confirmed, and the market continues nominally at \$12.50 to \$13. No changes are reported on any of the other grades.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel...	\$12.50 to \$13.00
No. 2 heavy melting steel...	10.50 to 11.00
Scrap rails	12.00 to 12.50
Compressed sheet steel ..	12.00 to 12.50
Bundled sheets, sides and ends	10.00 to 10.50
Cast iron carwheels	13.50 to 14.00
Sheet bar crops, ordinary...	13.50 to 14.00
Heavy breakable cast....	9.00 to 9.50
No. 2 railroad wrought...	12.50 to 13.00
Hvy. steel axle turnings...	10.50 to 11.00
Machine shop turnings...	6.00 to 6.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	16.00 to 16.50
Railr. coil and leaf springs	16.00 to 16.50
Rolled steel wheels.....	16.00 to 16.50
Low phos. billet and bloom ends	17.00 to 18.00
Low phos. mill plates....	15.50 to 16.00
Low phos. light grades....	15.50 to 16.00
Low phos. sheet bar crops	16.50 to 17.00
Heavy steel axle turnings.	10.50 to 11.00
Electric Furnace Grades:	
Low phos. punchings....	15.50 to 16.00
Heavy steel axle turnings.	10.50 to 11.00
Blast Furnace Grades:	
Short shoveling steel turnings	7.50 to 8.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings.....	7.50 to 8.00
Rolling Mill Grades:	
Steel car axles	18.00 to 18.50
Cupola Grades:	
No. 1 cast	12.00 to 13.00
Rails 3 ft. and under....	14.00 to 14.50

Globe Steel Tubes Co., Milwaukee, has organized a subsidiary company to be known as Globe Stainless Tube Co., to carry on a business of engineering, designing and manufacturing rustless steel tubes and tubular installations for corrosion and heat resisting purposes. The principal officers of the new company will be the same as of the Globe Steel Tubes Co.

CHICAGO

Year-End Steel Output Down to 35 Per Cent of Capacity—Upturn in January Seen

CHICAGO, Dec. 22.—Ingot output in this district has declined to 35 per cent of capacity, but specifications for deliveries after Jan. 1 are accumulating, and it seems assured that production will swing upward when the holiday season influences are past. Releases are near the average of the past six weeks, but as the bulk of them are for shipment in January they do not lend support to current production, which seems destined to go still lower when shutdowns over holidays are considered.

The character of business is such that operators are still uncertain as to the course to be taken in the matter of shutdowns. Consideration is being given to suspensions that will be longer than the customary Christmas day closing. As matters now stand some departments may be down from Wednesday night through the remainder of the week, but some plate mills and possibly rail mills may be out of service only one day. Fourteen of 36 steel mill blast furnaces remain in blast and four merchant stacks, operating at 60 per cent of capacity, are in use.

Year-end news in the railroad field is scant. The Denver & Rio Grande Western is reported to have ordered 10,000 tons of rails from the Colorado mill. The Duluth, Missabe & Northern has ordered 1600 tons of rails from Illinois Steel Co. Fresh prospects for cars are lacking, and expected inquiries from the Milwaukee Road and the Illinois Central still are topics of interest.

The outlook for improvement in structural business is improving. The Wabash will build a bridge in Missouri that will take close to 18,000 tons and the Ogden Avenue link, Chicago, calls for 7000 tons of structural shapes and 3000 tons of reinforcing bars.

Ferroalloys

Ferromanganese contracting is practically at an end, with \$85 a ton, seaboard, the ruling quotation on the size of tonnages that usually move in this district.

Pig Iron

The old year is drawing to a close with new business and fresh inquiries for Northern foundry iron still on a substantial scale. However, shipments are tapering and total deliveries in December will not equal by about 10 per cent the volume moved in November. Specifications for pig iron that is to be delivered after Jan. 1 are increasing. Four merchant stacks are lighted in this district, but their combined output is not more than 60 per cent of their rated capacity. Most

Output of steel declines to 35 per cent of capacity, with further reduction imminent as many departments will close over holiday period.

* * *

Orders for January shipment of steel and pig iron in fair volume, indicating moderate upturn early next month.

* * *

Structural steel prospects increasing. Wabash Railroad to build bridge calling for 18,000 tons of steel.

* * *

Scrap market remains dull, with no improvement in prices.

local foundries are planning a 10-day shutdown at the end of the year.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25.....	\$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75.....	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus.....	17.50
Lake Super. charcoal, sil. 1.50.....	27.04
S'th'n No. 2 fdy., sil. 1.75 to 2.25.....	17.51
Low phos., sil. 1 to 2 cop-per free.....	\$28.50 to 29.20
Silvery, sil. 8 per cent.....	26.79
Bess. ferrosilicon, 14-15 per cent.....	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Cast Iron Pipe

Further indication is afforded that a major buying movement is under way in cast iron pipe. Awards are large and new tonnage coming into the market, both from public and private buyers, is very attractive. Although winter buying prices have not been announced, concessions are common, the gage being competition by foreign makers, the size of the tonnage and the desirability of certain sizes. An important feature of the market is the strong urge to purchase only American-made pipe. Milwaukee, which has an inquiry out for 6000 tons, has written in its specifications that the pipe to be furnished must be of American make. Detroit, which has closed for 11,000 tons, accepted bids from French makers, but has recommended that contracts for all the tonnage be given to the lowest American bidders. Foreign competition brought out low prices at Detroit, the range being not far from \$29 to \$30 a ton, Birmingham. On the other hand, Fort Wayne, Ind., will be furnished 1000 tons by James B. Clow &

Sons at \$35.10 a ton, Birmingham, and the Glamorgan Pipe & Foundry Co. will ship 2000 tons to Chicago at \$35.25 a ton, Birmingham. All bids have been rejected on 600 tons for St. Cloud, Minn., and there has been no move made to readvertise for this pipe. Minneapolis will take bids Jan. 5 on 2000 tons of 6 to 16-in. pipe, and Saginaw, Mich., is in the market for 500 tons of 6 to 24-in. pipe, on which bids will be opened Jan. 18.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$43 to \$46; 4-in., \$46 to \$49; Class A and gas pipe, \$3 extra.

Sheets

Forward contracting, which gained much headway a week ago, continues to progress, and probably from 50 to 60 per cent of users have signed first quarter contracts. By way of contrast, it may be pointed out that a year ago future commitments were very light and sales up to the beginning of the year were far below normal. This market, as to its price structure, is not without some weak points, but on the whole it may be said that quotations generally are holding better than at mid-December. Spot buying is dwindling as the holidays approach and specifications are shrinking to the point where operations in the final week of the month cannot yet be determined.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.50c. to 2.60c.; No. 24 galv., 3.05c. to 3.15c.; No. 10 blue ann'd, 2.05c. to 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Bars

This market is quiet, especially in shipments. New buying is of little moment, but specifications, most of which are for delivery after Jan. 1, are at the average of recent weeks. Mild steel bars are moving at 1.70c. a lb., Chicago.

Quotations for iron bars remain at 1.70c. a lb., Chicago, for delivery now or in the new year. New orders are still very small, but in the aggregate make a better showing than at mid-December. Practically all of this business is emanating from railroad shops that recently have added workers and are now going more extensively into repair work.

Specifications for alloy steel bars are comparatively steady, which is rather unusual for this time of the year. Shipments to automobile plants are holding well and miscellaneous users, who are said to have small supplies on hand, are accepting deliveries with very little change in total volume. Some encouragement comes from farm implement manufacturers,

who, in shaping January schedules, indicate that they will use more steel after Jan. 1.

Prices for rail steel bars are steadier at 1.60c. a lb., district mill. Specifications are light and little interest is being shown in future requirements.

Bolts, Nuts and Rivets

Current specifications, the bulk of which are for delivery after Jan. 1, show improvement, and total releases in December are a shade higher than in November. On the other hand, shipments in the current month will not measure up to the November volume. Forward contracting to date has been normal. Prices are steady. Agricultural implement manufacturers are still non-committal as to future plans.

Rails and Track Supplies

Western mills are producing at 50 per cent of capacity. There are no new developments either in buying or in inquiries. The Pennsylvania will take figures on 200,000 tons of rails, but this railroad, it is said, will carry over about one-third of last year's tonnage. Fresh inquiries for track fastenings total 8000 tons. It is believed here that 1931 will be as important a year in track-laying programs as 1930 was intended to be. Some of the programs that were not completed this year will go through during the next 12 months. Some support is given this thought by new contracts, together with the rail tonnage being carried over and the rails now in the hands of the railroads.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 1.95c.; angle bars, 2.75c.

Wire Products

Forward contracting is making headway, but its progress is slow and below the expectations of sellers. Shipments in December will fall 5 to 10 per cent from the November total, but in view of recent specifications it is not unlikely that January will show a slight upturn from the low. Prices are moderately steady, though concessions have been made on nails even when they move in mixed cars with sheets.

Plates

Demand for plates is unusually quiet when it is recalled that this commodity has in recent weeks been one of the most active. Although it is reported that several interesting tank programs are projected, requests for steel have not reached the open market. Car builders, though somewhat encouraged by the recent distribution of orders by the Santa Fe, must face the fact that additional large buying is not in prospect in the near future. Line pipe manufacture at Milwaukee continues on a comfortable scale, but from all indications the present program is not now extended beyond about the middle of January. Prices for plates have settled to 1.70c.

a lb., Chicago, after an unsuccessful attempt to obtain \$1 more.

Structural Material

Outstanding in this week's news is the announcement that the Wabash will build a bridge across the Missouri River and that 17,700 tons of steel will be required. Other inquiries now out for figures total about 14,000 tons. Awards are very light. Prices for shapes are 1.70c. a lb., Chicago.

Reinforcing Bars

Bending shop operations in this district have been cut to 25 per cent of capacity, and present plans are to suspend output for at least a week at the year's end. Estimators, who early in the month experienced an upturn in fresh inquiries, now report requests for prices at low ebb. Awards in recent days have all been small, and each one has been keenly contested. Price unsettlement shows no improvement. In fact, orders of less than 50 tons each are moving at figures which several months ago would have applied to much larger business.

Coke

Shipments of by-product foundry coke are steady, and the total volume in December will top the figure for November. This is contrary to the movement of pig iron, but can be accounted for by the desire of consumers to increase stocks in anticipation of the approach of severe winter weather, which often demoralizes freight traffic. The price is steady at \$8 a ton, local ovens.

Old Material

The Western scrap iron and steel market has shown little variation in recent days. Steel mill operators, who are still undecided about shutdowns at the end of the year, are holding down acceptances of heavy melting steel and, when sellers are inclined to force scrap in too fast, it is promptly turned away. Stocks in the hands of

large users are near the peak for the past 12 months and, on this score, brokers are not optimistic as to the volume of business that will be done in the next month or two. In the absence of offers from consumers, local dealers are holding heavy melting steel at \$10.50 a gross ton, delivered, and during this period of curtailed consumption are finding supplies free at \$10. Demand for hydraulic bundles is very sluggish, and most consumers have cut incoming shipments to the low point of the year. There are times when shipments out of town hold up even when local deliveries have been cut, but now the movement is slow in all directions. Foundry grades of all descriptions are almost a dead issue, as it is a general practice for the foundry melt to be greatly reduced if not cut off altogether at the end of the year. Mills that reroll old rails, though operating at reduced rates, are still inclined to accept shipments and to add to tonnages on hand. In the absence of buying, even in small lots, the price structure in the Chicago market is for the most part nominal.

Prices deliv'd Chicago district consumers:
Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$10.00 to \$10.50
Shoveling steel.....	10.00 to 10.50
Frogs, switches and guards, cut apart, and misc. rails	11.25 to 11.75
Factory hyd. comp. sheets	8.50 to 9.00
Drop forge flashings.....	7.75 to 8.25
No. 1 busheling.....	7.50 to 8.00
Forg'd cast and r'd steel carwheels.....	13.50 to 14.00
Railroad tires, charg. box size.....	13.50 to 14.00
Railroad leaf springs cut apart.....	13.50 to 14.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	12.00 to 12.50
Coil springs.....	13.50 to 14.00
Electric Furnace Grades:	
Axle turnings.....	9.25 to 9.75
Low phos. punchings.....	11.50 to 12.00
Low phos. plates, 12 in. and under.....	11.50 to 12.00
Blast Furnace Grades:	
Axle turnings.....	5.25 to 5.75
Cast iron borings.....	5.50 to 6.00
Short shoveling turnings.....	5.00 to 5.50
Machine shop turnings.....	4.25 to 4.75
Rolling Mill Grades:	
Iron rails.....	11.00 to 11.50
Rerolling rails.....	12.50 to 13.00
Cupola Grades:	
Steel rails, less than 3 ft.....	12.50 to 13.00
Steel rails, less than 2 ft.....	13.50 to 14.00
Angle bars, steel.....	11.75 to 12.25
Cast iron carwheels.....	11.75 to 12.25
Malleable Grades:	
Railroad.....	12.25 to 12.75
Agricultural.....	11.25 to 11.50
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heavier.....	26.00 to 31.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars.....	10.50 to 11.00
Iron arch bars, and transoms.....	11.00 to 11.50
Iron car axles.....	20.00 to 21.00
Steel car axles.....	13.00 to 13.50
No. 1 railroad wrought.....	8.50 to 9.00
No. 2 railroad wrought.....	8.75 to 9.25
No. 1 busheling.....	6.50 to 7.00
No. 2 busheling.....	4.50 to 5.00
Locomotive tires, smooth.....	12.50 to 13.00
Pipes and flues.....	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast.....	9.50 to 10.00
No. 1 railroad cast.....	9.00 to 9.50
No. 1 agricultural cast.....	8.50 to 9.00
Stove plate.....	7.50 to 8.00
Grate bars.....	7.00 to 7.50
Brake shoes.....	7.25 to 7.75

*Relaying rails, including angle bars to match are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

Base per Lb.	
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.90c.
Reinforcing bars, billet steel.....	1.70c.
Rail steel reinforcement.....	1.50c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.35c.
Flats and squares.....	3.85c.
Bands $\frac{3}{4}$ in. (in Nos. 10 and 12 gages).....	3.10c.
Hoops (No. 14 gage and lighter).....	3.65c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Blue ann'l'd sheets (No. 10).....	3.35c.
Spikes ($\frac{3}{4}$ in. and larger).....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
Per Cent Off List	
Machine bolts.....	60 and 10
Carriage bolts.....	60 and 10
Coach or lag screws.....	60 and 10
Hot-pressed nuts, sq., tap. or blank, 60 and 10.....	60 and 10
Hot-pressed nuts, hex., tap. or blank, 60 and 10.....	60 and 10
No. 8 black ann'l'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	\$2.30 to 2.55
Cement c'd'd nails, base per keg.....	2.30 to 2.55

CLEVELAND

Consumers Ordering Steel for January Shipment, Bringing Gain in Bookings

CLEVELAND, Dec. 22.—Specifications for heavy hot-rolled products are holding up fairly well and, instead of a December slump, the volume of business this month with some of the mills will show a moderate gain over that of last month. The increase is mostly in bar orders. This evidently is due to the placing of specifications against contracts taken at 1.60c., Cleveland, or \$1 a ton below the current and first quarter price.

With stocks well exhausted, many consumers are ordering steel for January production and are specifying delivery at convenience of the mills, but will receive shipments early in the coming month.

The suspension by a number of automobile plants for two weeks has resulted in a tapering off in orders for sheets and strip from these plants and from stamping manufacturers, and there is also a slowing down of orders for these products from some other consuming industries due to a suspension of activities during the remainder of the year. One Michigan automobile manufacturer in the low-priced field has contracted for considerable tonnage of steel for the first quarter. Many consumers in other industries are deferring the placing of orders until January.

Sentiment in the steel and consuming industries has improved and better conditions are looked for early in the year.

Extensive road building programs will be carried by a number of States in 1931. In Ohio and western New York there will be a great deal of highway bridge construction during the coming year. Manufacturers of steam shovels report an increase in orders and inquiries for their equipment for road building and other work.

Steel plant operations in Cleveland are unchanged at 47 per cent of ingot capacity. One local steel plant shut down an open-hearth furnace and another put on an additional furnace. Some of the Ohio sheet mills will be shut down for the holidays and others have enough orders for the automotive industry to keep them in partial operation. The Empire Steel Corp. on Monday resumed the operation of its Cleveland sheet plant, which has been shut down 13 months.

Pig Iron

Sales and inquiry fell off the past week, during which Cleveland interests sold 11,000 tons. With many foundries shut down for the holidays, shipping orders have declined sharply. While the market appears firmer in some sections to the extent that differentials are being maintained, one seller has no open quotation for iron for delivery in competitive territories

and is making such concessions as are necessary to absorb freight rates and meet competition. However, the usual range in Lake furnace prices on foundry and malleable iron is \$16 to \$16.50. For Cleveland delivery, the \$17.50 furnace price is being maintained. In Michigan, \$17.50 is the ruling quotation for most points outside of Detroit.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25.....	\$17.50
S'th'n fdy., sil. 1.75 to 2.25.....	17.01
Malleable.....	17.50
Ohio silvery, 8 per cent.....	25.00
Stand. low phos., Valley.....	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Iron Ore

Consumption of Lake Superior ore during November amounted to 2,639,836 tons, a decrease of 410,224 tons from October. This compares with 4,700,925 tons used during the same month last year. Furnace stocks Dec. 1 amounted to 34,760,480 tons and the amount in furnace yards and on Lake Erie docks on that date was 41,226,806 tons, against 41,499,687 tons on the same day a year ago. Central district furnaces in November used 1,287,700 tons of ore, a decrease of 294,982 tons for the month, Lake front furnaces consumed 1,265,072 tons, a decrease of 112,640 tons, and all-rail furnaces melted 64,267 tons, a decrease of 4081 tons. Eastern furnaces used 22,797 tons, an increase of 14,079 tons. There were 94 furnaces in blast using Lake ore Nov. 30, a decrease of six for the month.

Bars, Plates and Shapes

A large proportion of the steel bar consumers in this territory have contracted for the first quarter at 1.65c., Cleveland, and there has been a moderate amount of contracting in plates and shapes at a range of 1.60c. to 1.65c., Pittsburgh, the lower price applying to a considerable portion of the trade. The market shows a firm tone and efforts will be made to maintain the 1.65c. price to all consumers not under contract.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.85c.
Reinforc. steel bars.....	2.25c. to 2.50c.
Cold-fin. rounds and hex.....	3.40c.
Cold-fin. flats and sq.....	3.90c.
Hoops and bands, No. 12 to 14 in., inclusive.....	3.10c.
Hoops and bands, No. 13 and lighter.....	3.65c.
Cold-finished strip.....	5.95c.
Black sheets (No. 24).....	3.60c.
Galvanized sheets (No. 24).....	4.35c.
Blue ann'd sheets (No. 10).....	3.10c.
No. 9 ann'd wire, per 100 lb.....	\$2.35
No. 9 galv. wire, per 100 lb.....	2.80
Com. wire nails, base per keg.....	2.25

*Net base, including boxing and cutting to length.

Sheets

While specifications have been fair the past week from scattered sources, orders from some of the more important consuming industries are now slowing down and not much additional business is looked for until after the first of the year. Most consumers who usually place contracts have contracted for the first quarter. The Fisher Body Corp. is expected to enter the market again in a few days for a round tonnage of sheets for making Chevrolet bodies in its Cleveland plant, its recent orders for close to 10,000 tons having covered its requirements only to Jan. 15. Prices are better stabilized than for some time and, while not much business is being taken at the higher price on grades quoted at a price spread, the minimum quotations are being maintained.

Strip Steel

There has been a moderate amount of first quarter contracting in hot-rolled strip, but the slowing down of the automotive industry for the holidays is reflected in a decline in specifications. While pressure for price concessions is still in evidence, the market in this territory appears to be holding firm at 1.55c., Pittsburgh, for wide strip and 1.65c. for narrow. Consumers of cold-rolled strip are showing no interest in contracts and are ordering very little material.

Old Material

The market is lifeless, and little activity is expected before January. A local mill is taking scrap in limited quantities, but shipments are still being held up in the Valley district. With yard stocks large, dealers virtually have ceased to buy scrap. The market is weak, but quotations are unchanged and nominal.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$10.25 to \$10.75
No. 2 heavy melting steel.....	9.75 to 10.25
Compressed sheet steel.....	9.75 to 10.00
Light bundled sheet stampings.....	8.50 to 9.00
Drop forge flashings.....	9.75 to 10.00
Machine shop turnings.....	4.75 to 5.25
Short shovelling turnings.....	7.75 to 8.00
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	10.00 to 10.50
No. 1 busheling.....	9.50 to 10.00
Pipes and flues.....	6.50 to 7.00
Steel axle turnings.....	9.50 to 10.00
Acid Open-Hearth Grades:	
Low phos., billet bloom and slab crops.....	16.50 to 17.00
Blast Furnace Grades:	
Cast iron borings.....	7.00 to 7.25
Mixed borings and short turnings.....	7.00 to 7.25
No. 2 busheling.....	6.50 to 6.75
Cupola Grades:	
No. 1 cast.....	12.00 to 12.50
Railroad grate bars.....	10.00 to 10.50
Stove plate.....	10.50 to 11.00
Rails under 3 ft.....	16.00 to 16.50
Miscellaneous:	
Rails for rolling.....	16.25 to 16.50
Railroad malleable.....	12.50 to 13.00

NEW YORK

Steel Sales Mostly for January Shipment— Pig Iron Orders Drop

NEW YORK, Dec. 22.—The pig iron market reflects the influence of the approaching holiday and inventory period. Sales, at 6000 tons, compare with 7500 tons in the previous week and 11,000 tons two weeks ago. New inquiries are light and shipments are small. The first of the year will find foundry yards virtually bare. For this reason, January is expected to bring out numerous specifications and small orders. It is notable that the smaller foundries have as yet purchased little iron for the coming quarter and heavier demand from them is generally expected.

The inquiries of the Thatcher Co., Newark, N. J., for 3000 tons, and of the Essex Foundry, Newark, for 600 tons, are still unclosed. The Worthington Pump & Machine Corp.'s inquiry for 2600 tons also remains unsatisfied except for the purchase of about 150 tons for Holyoke, Mass. The price situation is still sensitive, but has shown no further marked change.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	\$20.41 to \$20.91
*Buff. No. 2, del'd east.	
N. J. No. 2 fdy., sil.	18.28 to 19.28
East. Pa. No. 2 fdy., sil.	17.39 to 18.39
1.75 to 2.25	
East. Pa. No. 2X fdy., sil.	17.89 to 18.89
2.25 to 2.75	

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Cast Iron Pipe

Public utilities in the market for pressure pipe to be delivered during the winter months are seeking substantial concessions, but the range of prices at which orders are actually being placed continues at \$35 to \$36, f.o.b. Northern foundry. R. P. Stevens & Co., New York, buying for small utilities in the Northeast, have closed on upward of 1000 tons of pipe, and the Federal Water Service Corp. has bought about 6000 tons from three makers.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$37.90 to \$38.90; 4-in. and 5-in., \$40.90 to \$41.90; 3-in., \$47.90 to \$48.90. Class A and gas pipe, \$3 extra.

Finished Steel

A moderate improvement in the volume of steel orders has developed within the past week, but scarcely any of the steel is wanted this month. Definite shipping instructions for January accompany most of the orders. Developments of striking importance are lacking to support a somewhat more hopeful attitude, but orders on hand indicate that many manufacturing consumers and distributors of steel will take shipments somewhat more freely in the next month than they have this month and last.

The railroads offer prospects of some fairly substantial buying in the next few weeks. The New York Central will distribute soon its rail orders, amounting to 170,000 tons, and will take bids Dec. 29 on its general steel requirements for the first quarter. The Erie, which recently ordered rails, is in the market for tie plates, the quantity not stated.

There are no new developments in prices, both producers and consumers awaiting the test which will come with specifications against contracts for the first quarter. The attitude of the mills on prices is quite firm, though the \$1 a ton advance on bars, plates and shapes, recently announced, has not been generally obtained. It has applied more frequently to bars than to plates and shapes.

Warehouse Business

The first three weeks of December have compared favorably with previous weeks, but orders are decreasing now with the year-end approaching, so that the month's total may register a reduction. Prices are generally maintained, with only occasional concessions for desirable orders, except on sheets, where \$1 to \$3 a ton is the usual reduction for desirable business.

Reinforcing Bars

Awards are light, but several large projects have been added to the pending list. It is understood that the general contract for the section of

the West Street highway, New York, to be built by the New York Central Railroad, requiring 1200 tons of bars, has been split three ways. Bar distributors find that 1930 shipments will be about on a par with those of 1929, but that sales will show a decline of about 20 per cent.

For mill shipment, distributors of concrete bars quote 1.70c. a lb., Pittsburgh, on building and paving work, and 1.80c. on subway work (rail steel offered at \$4 a ton less); for delivery from local stock, 2.35c. a lb., New York, up to 3.05c. a lb. for lots of less than 2 tons.

Coke

Specifications continue to decline as the holidays draw near. Furnace coke prices are unchanged at \$2.50 to \$2.60 a net ton, Connellsville, and foundry coke quotations follow:

Special brands of beehive foundry coke, \$4.70 to \$4.85 a net ton, ovens, or \$8.41 to \$8.56 delivered to northern New Jersey, Jersey City and Newark, and \$9.29 to \$9.44 to New York and Brooklyn; by-product foundry coke, \$9 to \$9.40, Newark or Jersey City; \$10.06, New York or Brooklyn.

Old Material

Expectation that there may be some improvement in business in the new year is affecting the scrap trade, and dealers are inclined to turn down offers at the present price level, although there are ample supplies of scrap. Brokers, with orders for heavy breakable cast for delivery to a Florence, N. J., foundry, are still paying \$10.75, which is 25c. a ton more than they are receiving. No. 1 heavy melting steel is still inactive, but brokers are paying \$11 a ton to fill existing contracts with eastern Pennsylvania consumers. Exports of heavy melting steel and cast scrap from Texas ports continue to be greatly curtailed with Japan out of the market, and some of this accumulation is beginning to move by barge to Atlantic Coast ports.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$7.50
Heavy melting steel (yard)	\$5.25 to 5.50
No. 1 hvy. breakable cast..	6.75 to 7.75
Stove plate (steel works)..	5.00
Locomotive grate bars....	5.00
Machine shop turnings...	3.50
Short shoveling turnings...	3.50
Cast borings (blast fur. or steel works)	3.50
Mixed borings and turnings	3.00
Steel car axles	14.00
Iron car axles	19.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	7.25
Forge fire	7.00
No. 1 railroad wrought..	8.75
No. 1 yard wrought, long..	7.75
Rails for rolling	9.25 to 9.75
Stove plate (foundry)....	5.50
Malleable cast (railroad)..	9.50 to 10.00
Cast borings (chemical)..	8.50 to 9.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	\$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.); cupola size.....	10.50
No. 2 cast (radiators, cast boilers, etc.)	10.00

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars, small shapes.....	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal... ..	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll, strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue ann'd sheets (No. 10) ..	3.25c. to 3.40c.
Black sheets (No. 24*)	3.75c. to 3.85c.
Galvanized sheets (No. 24*) ..	4.25c. to 4.50c.
Long term sheets (No. 24)	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	4.15c.
Tire steel, ½ x ½ in. and larger..	3.40c.
Smooth finish, 1 to 2½ x ¾ in. and larger	3.75c.
Open-hearth spring steel, bases, ..	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller.....	65
1 x 30 in. and smaller.....	65
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	65
¾ x 20 in. and smaller.....	65
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00

PHILADELPHIA

Steel Mills Close for Holidays— Plate Contracting Fair

PHILADELPHIA, Dec. 22.—Steel mills are closing for part or all of the holiday period, certain mills suspending operations for the current week only, while others are closing between Christmas and New Years Day. The leading independent interest is continuing operations through this period on a greatly curtailed schedule, to fill certain small orders for prompt delivery. Contracting for plates and shapes for first quarter has been fair, plate commitments especially being larger than in any quarter of 1930.

The Pennsylvania Railroad rail requirements for next year, totaling about 200,000 tons, will be allocated after Jan. 1. Locomotives for the New York Central Railroad to the number of 40 have been placed with the American Locomotive Co. and 10 for the Boston & Albany Railroad went to the Lima Locomotive Works. The United States Navy is inquiring for bids for light cruiser No. 37, which will require 4000 to 5000 tons of steel.

Pig Iron

Although the pressure of low prices quoted by Southern pig iron producers has relaxed somewhat, with production being curtailed in the Birmingham district, the eastern Pennsylvania foundry iron quotations continue at \$17 to \$17.50 a ton, furnace. Small foundry iron requirements continue to be placed for the first quarter, but only a small percentage of total needs is estimated to have been covered in advance. The Sanitary Co. of America, Linfield, Pa., has closed on 1000 tons of foundry grade and the American Engineering Co., Philadelphia, has bought 1500 tons for first quarter. The latter purchase is about one-third larger than the usual requirements of this consumer. No basic iron buying is expected until some time in January.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$17.76 to \$18.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	18.26 to 19.26
East. Pa. No. 1X.	18.76 to 19.76
Basic (del'd east. Pa.)	17.75 to 18.25
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Steel Bars

Quotations are at a minimum of 1.60c., Pittsburgh, or 1.89c., Philadelphia, on medium-sized orders for forward delivery, with 1.65c., Pittsburgh, or 1.94c., Philadelphia, quoted on small lots. Some low-priced competition is being offered in this district

by imports of French and Belgian steel bars. Except for the award of 400 tons of reinforcing bars in a new factory for the Philadelphia Storage Battery Co., current reinforced concrete projects are small. Billet steel bars are unchanged at 1.65c. to 1.75c., Pittsburgh, or 1.94c. to 2.04c., Philadelphia. Rail steel bars are quoted at 1.50c., Franklin, Pa., or 1.79c., delivered Philadelphia.

Plates and Shapes

Many of the larger consumers of plates have been protected for the next quarter at 1.70c., Coatesville, Pa., or 1.80½c., Philadelphia. On small plate tonnages for prompt shipment, an effort is being made by mills to obtain 1.75c., Coatesville, or 1.85½c., Philadelphia, and this is expected to be the minimum price on new business during the next quarter. Shape quotations range from 1.65c., f.o.b. nearest mill to consumer, or 1.71c., Philadelphia, at which the larger users have in certain cases been protected, to 1.75c., mill, or 1.81c., Philadelphia, the quotation on small lots. One large shape mill in this district continues to quote a minimum of 1.70c., mill.

Sheets

Consumers have adequate supplies at present rates of operation to carry them into next year, so that buying is limited to minor orders. Blue annealed sheets, No. 13 gage, are quoted at 2.05c., Pittsburgh, and blue annealed plates, No. 10 gage, at 1.90c., Pittsburgh, or 2.19c., Philadelphia. Black sheets are 2.35c., Pittsburgh, or 2.64c., Philadelphia, and galvanized range from 2.90c., Pittsburgh, or 3.19c., Philadelphia, the quotation to large users and distributors, to 3c., Pittsburgh, or 3.29c., Philadelphia, quoted on small lots for prompt shipment.

Imports

In the week ended Dec. 20, arrivals at this port consisted of 7341 tons of

pig iron from British India and 10 tons of steel bars from Belgium.

Old Material

Holders of scrap are not inclined to accept offers of less than the current quotations, and most consumers show no interest in buying at present. No. 1 heavy melting steel is unchanged at \$11 to \$11.50 a ton, delivered.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel.	\$11.00 to \$11.50
No. 2 heavy melting steel.	9.50
Heavy melting steel (yard)	9.00
No. 1 railroad wrought.	13.00 to 14.00
Bundled sheets (for steel works)	9.00
Hydraulic compressed, new	10.00 to 10.50
Hydraulic compressed, old	9.00 to 9.50
Machine shop turnings (for steel works)	6.50 to 7.50
Heavy axle turnings (or equiv.)	10.50 to 11.00
Cast borings (for steel works and roll. mill)	7.50
Heavy breakable cast (for steel works)	11.00 to 11.50
Railroad grate bars.	9.00
Stove plate (for steel works)	9.00
No. 1 low phos. hvy.	
0.04% and under.	17.00 to 18.00
Couplers and knuckles.	16.50 to 17.50
Rolled steel wheels.	15.50 to 16.00
No. 1 blast f'nace scrap.	6.50 to 7.00
Wrot. iron and soft steel pipes and tubes (new specific.)	11.50 to 12.00
Shafting	18.00
Steel axles	20.50 to 21.00
No. 1 forge fire.	11.00
Cast iron carwheels.	14.00 to 14.50
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling.	13.50 to 14.00

Semet Solvay Engineering Corp., 40 Rector St., New York, has received an order from the Pittsfield Coal Gas Co., Pittsfield, Mass., for equipment to handle coal and coke for water gas manufacture, an order from the National Tube Co., Lorain, Ohio, for a Semet-Solvay light oil recovery unit, and a contract from the New York and Richmond Gas Co., Staten Island, for the rebuilding of its water gas equipment.

Steel Founders' Society of America, Inc., announces the following schedule: Annual meeting and election of officers, Thursday, Jan. 29, 1931, Hotel Hollenden, Cleveland; sales clinic and regular meeting, March 19 and 20, the Neil House, Columbus, Ohio; April meeting, the 23rd, at Pittsburgh; midsummer convention, time and place to be announced later.

American Hoist & Derrick Co., St. Paul, Minn., has purchased warehouse facilities in Chicago, where it maintains a sales office at 205 West Wacker Drive, and will carry complete stocks of new equipment and repair parts for prompt service to users of its hoisting machinery in that district.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq. twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats.	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¾-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
†Galvanized sheets (No. 24)	4.15c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 40 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

BOSTON

Pig Iron Sales at Minimum But Cast Iron Pipe Is Fairly Active

BOSTON, Dec. 23.—Pig iron sales the past week dropped to a minimum, having been largely confined to scattered car lots of Buffalo and east of Buffalo iron on a delivered basis equivalent to \$15.50 to \$16 a ton, on cars furnace, Buffalo, for No. 2X and No. 1X. Indian No. 2X iron was sold at \$19 to \$19.25 a ton, on dock here, duty paid. An inquiry for 1400 tons for second, third and fourth quarter delivery, now pending, probably will not be closed until after Jan. 1. It is said that many New England foundries will carry over smaller pig iron stocks on Jan. 1 than on any similar date since before the war. Because of closings for inventory purposes and lack of business, the New England melt today is estimated at not more than 25 per cent of capacity.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25...	\$19.91 to \$20.91
*Buffalo, sil. 2.25 to 2.75...	19.91 to 20.91
*Ala., sil. 1.75 to 2.25.....	21.11
*Ala., sil. 2.25 to 2.75.....	21.61
†Ala., sil. 1.75 to 2.25.....	17.25
†Ala., sil. 2.25 to 2.75.....	17.75

Freight rates: \$4.91 all rail from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Cast Iron Pipe

While no important contracts were placed the past week, New Bedford, Mass., closed bids on 350 tons of 6 to 12-in. pipe, and Providence, R. I., announced it will close bids on Dec. 29 on 1700 tons, and Pawtucket, R. I., on Dec. 23 on 1400 tons of 4 to 20-in. Class C pipe. In addition, Lawrence, Mass., is taking bids on 150 tons of 6 to 12-in. pipe, and Yarmouth, Mass.,

will shortly be in the market for a round tonnage for its new \$75,000 water system. The cast iron pipe market appears to have more life than do markets for other products. For 6-in. and larger pipe, foundries are holding at \$36 a ton, foundry, or close to it, which brings the average delivered price up to about \$41 to \$41.50 a ton. A differential of \$3 is asked on Class A and gas pipe.

Old Material

Not enough business was transacted since our last report to establish actual prices. Aside from automobile scrap, there has been little accumulation of old material in deal-

ers' yards or at manufacturing plants during December.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.	\$6.60 to \$7.10
Scrap T rails	6.60 to 7.10
Scrap girder rails.....	5.60 to 6.10
No. 1 railroad wrought....	7.50 to 7.60
Machine shop turnings....	2.00 to 2.60
Cast iron borings (steel works and rolling mill)	2.00 to 2.60
Bundled skeleton, long....	5.75 to 6.10
Forge flashings	5.75 to 6.10
Blast furnace borings and turnings	2.00 to 2.10
Forge scrap.....	5.60 to 6.10
Shafting	12.50 to 13.50
Steel car axles	14.00 to 15.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	6.00 to 6.50
Rails for rolling	8.50 to 9.00
Cast iron borings, chemical	9.00 to 9.50
No. 2 cast	5.50 to 6.00

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$11.00 to \$11.50
No. 1 machinery cast....	11.50 to 12.50
Stove plate	8.00 to 8.50
Railroad malleable	13.00 to 13.50

BIRMINGHAM Pig Iron Demand Light, Price Situation Uncertain

BIRMINGHAM, Dec. 22.—Light demand for first quarter pig iron has delayed opening of books for the new period longer than had been anticipated and with this delay has come a degree of uncertainty that the present price of \$14, base Birmingham, will hold for the district. No sales of first quarter iron to regular customers are reported for the past several days and no new inquiries of importance have been reported. The market is in its customary holiday slump and shipments are moving slowly in small lots. In some cases foundries, in their efforts to keep stocks to the very minimum, have begun requesting shipments in half carload lots.

The No. 2 Thomas furnace of the Republic Steel Corp. was blown out on Dec. 15 for relining and overhauling. This work is expected to keep the furnace out for six or seven weeks. Active blast furnaces in the district now total eight. Seven of these are on foundry iron and one on basic iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.....	\$14.00
No. 1 fdy., 2.25 to 2.75 sil.....	14.50
Basic	14.00

Finished Steel

Mills have discontinued former minimum quotations of 1.75c. on bars, plates and shapes, and are now quoting 1.80c. only. No changes are announced on any other lines. New business failed to show increase last week, as in the two weeks preceding, but the fact that it about held its own is considered favorable in view of the nearness of the holiday period, when buying usually experiences a let-up. Prospects for nearby rail buying are reported more encouraging this week.

The Tennessee company is working five of its eight open-hearth at Fairfield, an increase of one. All at Ensley are still idle. Four of six are being

used by the Gulf States Steel Co. at Alabama City.

Cast Iron Pipe

Pressure pipe fabricators report a fair run of orders last week, though the aggregate dropped below the heavy bookings of the preceding week. No awards were announced on several large projects for which bids were opened. Included in new contracts of the American Cast Iron Pipe Co. last week were 185 tons for Houston, Tex., and 385 tons for El Paso, Tex. This company was reported low bidder on about 1000 tons for Phoenix, Ariz. An order for 275 tons for The Dalles, Ore., went to the Pacific States Cast Iron Pipe Co. The National Cast Iron Pipe Co. booked 400 tons for Glendale, Cal. A 400-ton project at Minot, N. D., was divided among the American Cast Iron Pipe Co., United States Cast Iron Pipe Co. and James B. Clow & Sons. The Central Foundry Co. has booked 1000 tons for Inkstef, Mich., and is reported low bidder on several hundred tons for Mobile, Ala. New orders of the McWane Cast Iron Pipe Co. include 175 tons for Norwood, Mass.

Bids have been opened, but no award announced on 800 tons for Kansas City, Mo., 500 tons for Tacoma, Wash., 2000 tons for Lawton, Okla., and 275 tons for Spartanburg, S. C. Milwaukee will open bids Dec. 23 on 600 tons. Bogalusa, La., will open bids Jan. 6 on 4300 tons of 12 and 16-in. pipe. Date for opening bids on 300 tons for Bremerton, Wash., has been changed to Dec. 24. Shops are closed for their usual holiday shut-down of seven to 10 days. Pressure pipe makers are openly offering concessions on winter buying for immediate shipment. Regular quotations continue to hold at \$37 to \$38, Birmingham.

Coke

By-product coke oven operations for this district continue at the low

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.26 1/2c.
Structural shapes—	
Angles and beams.....	3.26 1/2c.
Tees	3.26 1/2c.
Zees	3.26 1/2c.
Soft steel bars, small shapes....	3.26 1/2c.
Reinforcing bars.....	3.11 1/2c. to 3.26 1/2c.
Iron bars—	
Refined	3.26 1/2c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.50c.
Squares and flats.....	4.00c. to 6.60c.
Tool steel	6.00c.
Rivets, structural or boiler.....	4.80c.
Per Cent Off List	
Machine bolts .....	.60 and 5
Carriage bolts .....	.60 and 5
Lag screws .....	.60 and 5
Hot-pressed nuts .....	.60 and 5
Cold-punched nuts .....	.60 and 5
Stove bolts .....	.70 and 10

point of the year, with 903 active ovens and 487 idle ovens. Shipments have dropped considerably, and specifications that are coming in are mainly for early January delivery. Prices remain at \$5.

Old Material

The market for scrap is marking time. Some tonnages are reported to be under negotiation. Quotations are unchanged.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$10.00
Scrap steel rails.....	10.50
Short shoveling turnings.....	9.00
Cast iron borings.....	9.00
Stove plate.....	9.00
Steel axles.....	19.00
Iron axles.....	18.00
No. 1 railroad wrought.....	10.00
Rails for rolling.....	\$11.50 to 12.00
No. 1 cast.....	11.00 to 11.25
Tramcar wheels.....	11.00 to 11.25
Cast iron borings, chem.....	13.50
Cast iron carwheels.....	11.00

Canada

Pig Iron Inquiries More Numerous

TORONTO, Dec. 22.—Melters are beginning to show more interest in future pig iron requirements. Inquiries in the past week have been more numerous, and some first quarter buying has developed. Forward commitments, however, are in comparatively small tonnage. Prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable.....	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable.....	24.00
Basic.....	20.50

Old Material

Increased spot demand featured business in this market during the week. The betterment was due largely to the fact that consumers are without stocks and were forced into the market. Prices are unchanged.

Dealers' buying prices for old material: Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap.....	7.00	6.00
No. 1 wrought.....	6.00	8.00
Machine shop turnings.....	2.00	2.00
Boiler plate.....	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings.....	2.00	2.00
Steel borings.....	2.00	2.00
Wrought pipe.....	2.00	2.00
Steel axles.....	7.00	9.00
Axles, wrought iron.....	7.00	11.00
No. 1 machinery cast.....	10.00	10.00
Stove plate.....	8.00	8.00
Standard carwheels.....	8.50	8.50
Malleable.....	8.00	8.00

Per Net Ton

No. 1 mach'y cast.....	11.00	.....
Stove plate.....	9.00	.....
Standard carwheels.....	10.00	.....
Malleable scrap.....	9.00	.....

CINCINNATI

CINCINNATI, Dec. 22.—Despite the present attractive quotations on pig iron, district consumers show no interest in forward buying. Few contracts for first quarter have been placed. Inquiries are limited to three of 200 tons each. These come from melters in Kentucky, central Indiana and southern Ohio. A number of local consumers are carrying over sufficient stocks from this quarter to keep them covered at least until the middle of January. A further shrinkage in buying was noted last week, when furnaces accounted for approximately 1300 tons in small lots. With furnace representatives competing keenly for business, quotations on pig iron have a week undertone. For small orders, Northern iron is \$16.50, Lake furnace, and Southern iron is \$11, base Birmingham, but on attractive tonnages lower prices might be quoted.

Prices per gross ton, deliv'd Cincinnati: Ala. fdy., sil. 1.75 to 2.25.. \$14.19 to \$14.69 Ala. fdy., sil. 2.25 to 2.75.. 14.69 to 15.19 Tenn. fdy., sil. 1.75 to 2.25.. 14.19 to 14.69 S'th'n Ohio silvery, 8 per cent..... 24.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Steel

The usual holiday recession in demand brought a slight drop in bookings of district sheet mills. While there have been some orders for January shipment of sheets, a leading producer reports no apparent movement by consumers to cover for the first quarter. Inquiry, too, declined last week. Operations, which have been sustained for the last four or five weeks at a little above the 50 per cent mark, have receded to about 40 per cent.

Pig Iron Buying Confined to Small Lots—Sheet Orders Smaller

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
New billet reinfrc. bars.....	3.15c.
Rail steel reinfrc. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.35c.
Cold-fin. rounds and hex.....	3.80c.
Squares.....	4.30c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	4.20c.
Small rivets.....	.60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in.....	\$16.50
4-in.....	34.50
Seamless steel boiler tubes, 2-in.....	17.50
4-in.....	36.00

Old Material

The district scrap market is virtually inactive. Consumers show no interest in releasing shipments or closing new contracts. Prices have not been changed, since there has been no real test of the present schedules.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$10.00 to \$10.50
Scrap rails for melting.....	10.50 to 11.00
Loose sheet clippings.....	5.50 to 6.00
Bundled sheets.....	8.75 to 9.25
Cast iron borings.....	4.00 to 4.50
Machine shop turnings.....	5.00 to 5.50
No. 1 busheling.....	8.00 to 8.50
No. 2 busheling.....	4.50 to 5.00
Rails for rolling.....	11.50 to 12.00
No. 1 locomotive tires.....	11.00 to 11.50
No. 2 railroad wrought.....	9.50 to 10.00
Short rails.....	14.75 to 15.25
Cast iron carwheels.....	10.50 to 11.00
No. 1 machinery cast.....	14.00 to 14.50
No. 1 railroad cast.....	12.00 to 12.50
Burnt cast.....	6.50 to 7.00
Stove plate.....	6.50 to 7.00
Brake shoes.....	6.50 to 7.00
Agricultural malleable.....	12.00 to 12.50
Railroad malleable.....	13.00 to 13.50

YOUNGSTOWN Holiday Curtailment Sharp in Valley—Semi-Finished Steel \$1 Lower

YOUNGSTOWN, Dec. 22.—With activity in the Valley steel industry generally suspended this week because of the holiday, Youngstown companies are concentrating their attention on first quarter contracting. Most of the smaller users of steel have covered their needs for this period, but the larger consumers are rather slow in estimating their requirements. This is apparently due to lack of definite schedules of work during the early part of the year as the subject of price has practically ceased to be a point of contention. Recent attempts to stabilize prices seem to have been entirely successful, and the psychology of buyers is in accord with that of the manufacturers. In exceptional cases consumers have expressed willingness to contract for as long as a year ahead at pres-

ent quotations, and attempts to cover needs for the first half are not uncommon. On all occasions producers have refused to make commitments farther ahead than March 31, and it seems rather definitely assured that any semblance of improved demand after the first of the year will lead to price advances throughout the entire line of finished steel products.

No changes in prices have occurred in this district recently, except on semi-finished steel. While sellers have named no official price for first quarter, contracts are being made on the basis of \$30, Youngstown, on billets, slabs and sheet bars, representing a decline of \$1 a ton. This is the first change on semi-finished steel for several months, and in the meantime rather sharp reductions have been made on products turned out by the

principal buyers of crude steel. Wire rods recently declined \$1 a ton to \$35, Pittsburgh.

Bars and plates seem to be well established at 1.65c., Pittsburgh, and shipments against low-priced contracts placed earlier in the year are being completed. Makers of cold-finished steel bars are taking first quarter business at 2c. to 2.10c., Pittsburgh or Cleveland. Nails are holding at \$1.90 a keg to large jobbers, with the usual premium to the trade, and manufacturers' wire is generally quoted at 2.20c. to 2.30c. Strip prices are well maintained at recent levels, although some shading still persists on sheets. The 2.90c., Pittsburgh, quotation on galvanized sheets, which was intended to apply only to large jobbers, has been extended to the trade in a number of instances, although the official quotation on this class of business continues at 3c. On the common finishes recent minimum figures generally represent the market, although small lots occasionally command premiums of \$1 to \$2 a ton.

Holiday curtailment of operations has brought steel mill activity to the lowest point in recent years. Only one independent steel company blast furnace is active in the entire Valley territory, but four stacks are only banked and will blow in again soon after the first of the year. The Steel Corporation has four active furnaces at three plants. Open-hearth activity gained slightly last week preparatory to complete suspension this week. In some cases activity will not be resumed until Jan. 5, although stocks of crude steel are at a minimum. Pipe departments are most active among the finishing mills. Both the Youngstown and Republic companies have continued a fair operation in their new electric weld mills and still have some orders to complete. Lapweld and butt weld mills are scarcely maintaining mill crews. Sheet and strip units serving one or two automobile companies have held up fairly well, but have caught up sufficiently on orders to permit suspension at most points this week. Next week operations will be resumed to take care of automobile orders for early January shipment.

The primary markets are very dull. Pig iron users in the immediate Valley district do not appear anxious to contract for the future, and current shipments are light. On small orders the recent prices of \$17, Valley furnace, for foundry iron, and \$17.50 for malleable and Bessemer are holding. Basic iron is nominally quoted at \$17, although the market has not been tested. Consumers of scrap are not interested in placing orders and are holding up shipments at most points. Dealers' offering prices on No. 1 heavy melting steel range from \$12.50 to \$13, although they would be unwilling to sell a tonnage at even the higher figure. Hydraulic compressed sheets are slightly lower although not plentiful in this district. Automobile companies' offerings for next month are higher.

BUFFALO

BUFFALO, Dec. 22.—Sales of pig iron during the past week were probably less than 2000 tons for the district. Foundries, in an endeavor to reduce inventories, are ordering only for immediate needs. Many of them will be closed for a good portion of the remaining days in the month. Furnace operation is so low that furnace men believe that stocks of iron in furnace yards will soon be reduced. The only sizable inquiry is one for 500 tons of foundry for the General Electric Co.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25.....	\$17.50
No. 2X fdy., sil. 2.25 to 2.75.....	18.00
No. 1 fdy., sil. 2.75 to 3.25.....	19.00
Malleable, sil. up to 2.25.....	18.00
Basic.....	17.50
Lake Superior charcoal.....	27.28

Finished Steel

Operations of Buffalo steel mills continue on the level of a week ago, with the Lackawanna plant of the Bethlehem Steel Co. operating five open-hearths, the Donner works of the Republic Steel Corp. two, and Wickwire Spencer two. The holiday period may reduce these operations somewhat.

Elimination of a grade crossing over the New York Central tracks at Bowmanville, N. Y., will require 100 tons of reinforcing bars. A junior high school to be erected at Ithaca, N. Y., calls for 300 tons of structural steel, which has been placed with a Buffalo fabricator.

Old Material

Reports are current that the suspensions on shipments by the leading consumer will be lifted before Jan. 1. There is a report also that an order will be placed by this mill for melting steel before that date at 50c. a ton under its last price. The only activity during the past week has been a few small sales of stove plate at \$9.50, some cast iron borings at \$8 and some short shoveling steel turn-

Sales of Pig Iron Small—Steel Mill Operations Unchanged

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.15c.
Reinforcing bars.....	2.95c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.60c.
Bands.....	3.50c.
Hoops.....	3.90c.
Blue ann'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.60
Black wire, base per 100 lb.....	3.20

ings of a high grade at about \$8.50 for delivery outside of Buffalo. It is reported that 2500 tons of steel scrap from the Erie Railroad list came to Buffalo at \$11.25.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$10.50 to \$11.00
No. 2 heavy melting scrap.....	9.00 to 9.50
Scrap rails.....	11.00
Hydraul. comp. sheets.....	9.00 to 9.50
Hand bundled sheets.....	8.00 to 8.50
Drop forge flashings.....	9.00 to 9.50
No. 1 busheling.....	9.00 to 9.50
Hvy. steel axle turnings.....	11.00 to 11.50
Machine shop turnings.....	5.50 to 6.00
No. 1 railroad wrought.....	10.00 to 10.50

Acid Open-Hearth Grades:	
Knuckles and couplers.....	13.00 to 13.50
Coil and leaf springs.....	13.00 to 13.50
Roller steel wheels.....	13.00 to 13.50
Low phos. billet and bloom ends.....	15.00 to 15.50

Electric Furnace Grades:	
Short shov. steel turnings.....	8.50 to 9.00

Blast Furnace Grades:	
Short mixed borings and turnings.....	7.00 to 7.50
Cast iron borings.....	7.00 to 7.50
No. 2 busheling.....	6.00

Rolling Mill Grades:	
Steel car axles.....	15.00 to 15.50
Iron axles.....	16.00 to 16.50

Cupola Grades:	
No. 1 machinery cast.....	10.25 to 11.00
Stove plate.....	9.50 to 10.00
Locomotive grate bars.....	8.25 to 9.25
Steel rails, 3 ft. and under.....	15.00 to 15.50
Cast iron carwheels.....	13.50 to 14.00

Malleable Grades:	
Industrial.....	11.00 to 12.00
Railroad.....	11.00 to 12.00
Agricultural.....	11.00 to 12.00

Special Grades:	
Chemical borings.....	10.50 to 11.00

PACIFIC COAST

SAN FRANCISCO, Dec. 20 (By Air Mail)—Indications point to renewed activity in the Pacific Coast iron and steel markets early in January. Bookings this week involve some fair-sized tonnages and included 3000 tons of plates for a cruiser to be built at Mare Island. The price structure is unchanged.

Bars

Awards of reinforcing steel bars totaled 1400 tons. The Soule Steel Co. secured 800 tons for pier No. 23, San Francisco. The Concrete Engineering Co. booked 250 tons for a hospital at Agnew, Cal. The Truscon Steel Co. took 137 tons for a ware-

Renewed Business Activity Expected Early in January

Pig iron prices per gross ton at San Francisco:

*Utah basic.....	\$22.00 to \$24.00
*Utah fdy., sil. 2.75 to 3.25.....	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25.....	22.00 to 24.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

house in San Francisco. Bids have been opened on 645 tons for a bridge on the Benson-Vail Highway near Phoenix and on 159 tons for highway work in Santa Barbara County, Cal. Reinforcing bars are unchanged in the San Francisco and Los Angeles districts at 2.50c., base, on carload

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars.....	3.40c.
Black sheets (No. 24).....	4.35c.
Blue ann'l'd sheets (No. 10).....	3.80c.
Galv. sheets (No. 24).....	5.00c.
Struc. rivets, 1/2-in. and larger....	5.00c.
Com. wire nails, base per keg....	\$3.35
Cement c't'd nails, 100 lb. keg.....	3.35

lots, while merchant bars are quoted at 2.25c., c.i.f. Demand for the latter class of material is spotty.

Plates

Bookings exceeded 4000 tons. The Western Pipe & Steel Co. placed 700 tons additional for a 38- and 51-in. welded steel pipe line for Los Angeles. The Pittsburgh-Des Moines Steel Co. was awarded 200 tons for a 250,000-gal. tank and tower for Olympia, Wash., and was low bidder on 243 tons for tanks to be erected at Boulder City, Nev., for the United States Bureau of Reclamation. Bids have been opened on 1300 tons for a 4- to 30-in. welded steel pipe line for the Howard Flat Irrigation District at Chelan, Wash. Prices range from 2.05c. to 2.15c., c.i.f.

Fabricated Steel

Bookings were limited to a few projects. The Golden Gate Iron Works took 200 tons for an apartment house in San Francisco, the Isaacson Iron Works secured 200 tons for the Snoqualmie River bridge, Olympia, and the Minneapolis-Moline Power & Implement Co. was awarded 125 tons for a studio in Burbank. The Pomeroy Co. secured the general contract for the Feather River bridge at Polga, Cal., involving 787 tons. It is expected that the subcontract for the structural steel will be placed within the next few days. Shapes range from 2.15c. to 2.25c., c.i.f.

Cast Iron Pipe

San Francisco awarded 927 tons of 6- and 8-in. Class 150 pipe as follows: American Cast Iron Pipe Co., 381 tons of 6-in.; National Cast Iron Pipe Co. and the United States Pipe & Foundry Co., 273 tons each of 8-in. The Grinnell Co. booked 135 tons of 2-in. for Long Beach, Cal. The National Cast Iron Pipe Co. secured 540 tons of 20- to 30-in. Classes B and D pipe for Glendale, Cal. Bids have been opened on 144 tons of 6- and 8-in. Class 150 for The Dalles, Ore. The East Bay Municipal Utility District, Oakland, will open bids Jan. 3 on 1238 tons of 6- to 20-in. Classes B and 150 pipe.

Non-Ferrous Ingots Unfilled Orders

CHICAGO, Dec. 18.—On Dec. 1 unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute amounted to 27,221 net tons.

ST. LOUIS

Scrap Market Turns Slightly Stronger— Steel Prices Firm

ST. LOUIS, Dec. 22.—This has been a week of little interest in the pig iron market. Buying for first quarter shipment has been light, and the carryover of actual stocks of melters will not be very heavy, it is believed, although there are some unfilled contracts. The local maker is maintaining its price of \$17.50, f.o.b. Granite City. Prices of southern iron range from \$10.25 to \$10.50 a ton, f.o.b. Birmingham, for 1.75 to 2.75 silicon.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill....	\$17.50
Malleable, f.o.b. Granite City.....	17.50
N'th'n No. 2 fdy., deliv'd St. Louis.....	19.66
Southern No. 2 fdy., deliv'd.....	\$14.67 to 14.92
Northern malleable, deliv'd.....	19.66
Northern basic, deliv'd.....	19.66

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Steel

Buying of plates, shapes, bars and sheets is extremely light because of a desire to hold down inventories and a feeling of uncertainty as to what business the new year will develop. However, prices are firm. The quotations recently announced are being adhered to. While pending structural projects are few, an encouraging statement has been issued by the Industrial Club to the effect that a survey reveals building operations in the St. Louis district during 1931 will require expenditures of about \$113,000,000.

Old Material

In expectation of a buying movement either shortly before or after Jan. 1, the old material market is stronger, and some items are higher. Dealers' faith in the market is shown by their purchase of available scrap to lay down in their yards. The principal factor here, who, as stated in THE IRON AGE last week, has the largest stock in five years, purchased 1000 additional tons of steel grades to lay down in his yard. Stocks at mills are said to be low. Shipments

from the country dealers are light. Selected heavy melting steel, miscellaneous standard section rails, railroad springs, rails for rolling, steel car axles are 25c. a ton higher, and railroad malleable is up \$1.

Railroad lists: Chicago, Burlington & Quincy, 4845 tons; Chicago & Alton, 600 tons; Chicago & Eastern Illinois, 12 carloads; Mobile & Ohio, 9 carloads, and St. Louis Southwestern, 7 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel.....	\$10.50 to \$11.00
No. 1 heavy melting or shoveling steel.....	9.75 to 10.25
No. 2 heavy melting or shoveling steel.....	9.00 to 9.50
No. 1 locomotive tires.....	11.00 to 11.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart....	11.00 to 11.50
Railroad springs.....	13.25 to 13.75
Bundled sheets.....	6.50 to 7.00
No. 2 railroad wrought....	9.75 to 10.25
No. 1 bushelling.....	7.00 to 7.50
Cast iron borings and shoveling turnings.....	6.00 to 6.50
Iron rails.....	9.50 to 10.00
Rails for rolling.....	11.75 to 12.25
Machine shop turnings....	3.50 to 4.00
Heavy turnings.....	8.00 to 8.50
Steel car axles.....	14.50 to 15.00
Iron car axles.....	20.50 to 21.00
Wrot. iron bars and trans....	12.50 to 13.00
No. 1 railroad wrought....	7.50 to 8.00
Steel rails, less than 3 ft..	13.00 to 13.50
Steel angle bars.....	10.00 to 10.50
Cast iron carwheels.....	11.00 to 11.50
No. 1 machinery cast.....	10.50 to 11.00
Railroad malleable.....	11.00 to 11.50
No. 1 railroad cast.....	10.00 to 10.50
Stove plate.....	8.50 to 9.00
Relay. rails, 60 lb. and under.....	16.00 to 16.50
Relay. rails, 70 lb. and over.....	20.00 to 21.00
Agricult. malleable.....	10.00 to 10.50

By-Product Coke Output Drops Less Than Beehive

WASHINGTON, Dec. 23.—The output of by-product coke declined 13.9 per cent, pig iron, 24.6 per cent, and beehive coke more than 50 per cent in the first 11 months of 1930 when compared with the production in the corresponding period of last year, according to the Bureau of Mines.

The production of by-product coke was 42,437,218 net tons, compared with 49,294,880 tons, while pig iron production, based on figures of THE IRON AGE, was 29,733,415 gross tons, against 39,448,853 tons, and the beehive coke output was 2,593,800 net tons, against 5,670,100 tons. The total production of by-product coke in November was 3,137,110 tons, compared with 3,431,529 tons in October. The average daily rate during the 30 days of November was 104,570 tons, against 110,694 tons in October.

Orders were placed in October for 1189 steel boilers with 852,022 sq. ft., against 1254 with 1,282,388 sq. ft. in September, according to reports received by the Bureau of the Census from 81 manufacturers.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shafting, screw stock.....	3.60c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	4.60c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.10c.
Galv. corrug. sheets.....	4.70c.
Structural rivets.....	4.15c.
Boiler rivets.....	4.15c.
Per Cent Off List	
Tank rivets, 1/4-in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

Mill Prices of Semi-Finished Steel

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$30.00 to \$31.00
Rerolling, 4-in. and under 10-in., Youngstown	30.00 to 31.00
Rerolling, 4-in. and under 10-in., Cleveland	30.00 to 31.00
Rerolling, 4-in. and under 10-in., Chicago	32.00
Forging quality, Pittsburgh	36.00

Sheet Bars	
	Per Gross Ton
Pittsburgh	\$30.00 to \$31.00
Youngstown	30.00 to 31.00
Cleveland	30.00 to 31.00

Slabs	
	Per Gross Ton
(8 in. x 2 in. and under 10 in. x 10 in.)	
Pittsburgh	\$30.00 to \$31.00
Youngstown	30.00 to 31.00
Cleveland	30.00 to 31.00

Skelp	
	Per Lb.
(F.o.b. Pittsburgh or Youngstown)	
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods	
	Per Gross Ton
(Common soft, base)	
Pittsburgh	\$35.00
Cleveland	35.00
Chicago	36.00

Prices of Raw Material

Ores	
	Per Gross Ton
Lake Superior Ores, Delivered Lower Lake Ports	
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	
Per Unit	
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	11c.
Iron ore, basic Swedish, average 65% iron	9c.
Manganese ore, washed 52% manganese, from the Caucasus	26c. to 28c.
Manganese ore, Brazilian, African or Indian, basic 50%	26c. to 28c.
Tungstenore, high grade, per unit, in 60% concentrates	\$12.50 to \$13.00
Per Gross Ton	
Chrome ore, 45 to 50% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
Per Lb.	
Molybdenum ore, 85% concentrates of MoS ₂ delivered	50c. to 55c.

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.50
Foundry, f.o.b. Connellsville prompt	\$3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	5.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis ..	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.35 to \$1.50
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 3/4-in., f.o.b. Pa. mines ..	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines ..	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines ..	.65 to .75
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.15

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$80.00 to \$85.00
Foreign, 80%, Atlantic or Gulf port, duty paid	

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$28.00 to \$30.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$83.50
75%	130.00

Bessemer Ferrosilicon	
	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
10%	\$25.00
11%	26.00
12%	27.00

Silvery Iron	
	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
6%	\$21.00
7%	21.50
8%	22.00
9%	22.50
10%	23.00
11%	23.50
12%	24.00
13%	24.50
14%	25.00
15%	25.50
16%	26.00
17%	26.50
18%	27.00
19%	27.50
20%	28.00
21%	28.50
22%	29.00
23%	29.50
24%	30.00
25%	30.50
26%	31.00
27%	31.50
28%	32.00
29%	32.50
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32%	34.00
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36%	36.00
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38%	37.00
39%	37.50
40%	38.00
41%	38.50
42%	39.00
43%	39.50
44%	40.00
45%	40.50
46%	41.00
47%	41.50
48%	42.00
49%	42.50
50%	43.00
51%	43.50
52%	44.00
53%	44.50
54%	45.00
55%	45.50
56%	46.00
57%	46.50
58%	47.00
59%	47.50
60%	48.00
61%	48.50
62%	49.00
63%	49.50
64%	50.00
65%	50.50
66%	51.00
67%	51.50
68%	52.00
69%	52.50
70%	53.00
71%	53.50
72%	54.00
73%	54.50
74%	55.00
75%	55.50
76%	56.00
77%	56.50
78%	57.00
79%	57.50
80%	58.00
81%	58.50
82%	59.00
83%	59.50
84%	60.00
85%	60.50
86%	61.00
87%	61.50
88%	62.00
89%	62.50
90%	63.00
91%	63.50
92%	64.00
93%	64.50
94%	65.00
95%	65.50
96%	66.00
97%	66.50
98%	67.00
99%	67.50
100%	68.00

Other Ferroalloys	
	Per Gross Ton
Ferrotungsten, per lb. contained metal del'd	\$1.30 to \$1.40
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrocromium, 2% carbon	17.00c. to 17.50c.
Ferrocromium, 1% carbon	19.00c. to 20.00c.
Ferrocromium, 0.10% carbon	24.50c. to 26.00c.
Ferrocromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocantitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	\$91.00
Ferrophosphorus, electric 24%, f.o.b. Aniston, Ala., per gross ton	\$122.50
Silico-manganese, gross ton, delivered ..	\$135.00

Fluxes and Refractories	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$16.00
No. 2 lump, Illinois and Kentucky mines ..	20.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	\$17.00 to 17.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/4% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-Heat Intermediate	
Duty Brick Heavy Duty Brick	
Pennsylvania	\$43.00 to \$46.00 \$35.00 to \$38.00
Maryland	43.00 to 46.00 35.00 to 38.00
New Jersey	50.00 to 65.00
Ohio	43.00 to 46.00 35.00 to 38.00
Kentucky	43.00 to 46.00 35.00 to 38.00
Missouri	43.00 to 46.00 35.00 to 38.00
Illinois	43.00 to 46.00 35.00 to 38.00
Ground fire clay, per ton	7.00

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	\$8.50 to 10.00

Magnesite Brick	
	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick	
	Per Net Ton
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts	
	Per Cent Off List
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex. nuts, blank or tapped	73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
 †Bolts with rolled thread up to and including 3/4 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
	Per Cent Off List
Semi-finished hexagon nuts	73
Semi-finished hexagon castellated nuts, S.A.E.	73
Stove bolts in packages, F'gh	80, 10, 10 and 5
Stove bolts in packages, Chicago	80, 10, 10 and 5
Stove bolts in packages, Cleveland	80, 10, 10 and 5
Stove bolts in bulk, F'gh	80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Chicago	80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Cleveland	80, 10, 10, 5 and 2 1/2
Tire bolts	60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets	
	Base per 100 Lb.
(1/2-in. and larger)	
F.o.b. Pittsburgh or Cleveland	\$2.75
F.o.b. Chicago	2.85

Small Rivets	
	Per Cent Off List
(3/8-in. and smaller)	
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws	
	Per Cent Off List
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	80, 10 and 5
Upset set screws	80, 10 and 5
Milled studs	70

▲▲▲ Mill Prices of Finished Iron and Steel Products ▲▲▲

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c. to 1.65c.
F.o.b. Chicago.....	1.70c.
Del'd Philadelphia.....	1.89c.
Del'd New York.....	1.93c.
F.o.b. Cleveland.....	1.60c. to 1.65c.
F.o.b. Lackawanna.....	1.70c.
F.o.b. Birmingham.....	1.75c. to 1.80c.
C.i.f. Pacific ports.....	2.25c.
F.o.b. San Francisco mills.....	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.70c.
F.o.b. Birmingham, mill lengths.....	1.75c. to 1.80c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.50c. to 1.55c.
F.o.b. Chicago Heights mill.....	1.60c. to 1.65c.
Del'd Philadelphia.....	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago.....	1.70c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c. to 1.65c.
F.o.b. Chicago.....	1.70c.
F.o.b. Birmingham.....	1.75c. to 1.80c.
Del'd Cleveland.....	1.78½c. to 1.83½c.
Del'd Philadelphia.....	1.80½c.
F.o.b. Coatesville.....	1.70c.
F.o.b. Sparrows Point.....	1.70c.
F.o.b. Lackawanna.....	1.70c.
Del'd New York.....	1.88c.
C.i.f. Pacific ports.....	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c. to 1.65c.
F.o.b. Chicago.....	1.70c.
F.o.b. Birmingham.....	1.75c. to 1.80c.
F.o.b. Lackawanna.....	1.70c.
F.o.b. Bethlehem.....	1.70c.
Del'd Cleveland.....	1.78½c. to 1.83½c.
Del'd Philadelphia.....	1.71c. to 1.76c.
Del'd New York.....	1.85½c.
C.i.f. Pacific ports.....	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.65c. to 1.70c.
Wider than 6 in., P'gh.....	1.55c. to 1.60c.
6 in. and narrower, Chicago.....	1.75c. to 1.80c.
Wider than 6 in., Chicago.....	1.65c. to 1.70c.
Cooperage stock, P'gh.....	1.90c.
Cooperage stock, Chicago.....	2.00c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.00c. to 2.10c.
Bars, f.o.b. Chicago.....	2.00c. to 2.10c.
Bars, Cleveland.....	2.00c. to 2.10c.
Bars, Buffalo.....	2.00c. to 2.10c.
Shafting, ground, f.o.b. mill.....	2.45c. to 3.40c.
Strips, P'gh.....	2.25c. to 2.35c.
Strips, Cleveland.....	2.25c. to 2.35c.
Strips, del'd Chicago.....	2.53c. to 2.68c.
Strips, Worcester.....	2.50c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.40c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

	Base per Keg
Standard wire nails.....	\$1.90 to \$2.00
Cement coated nails.....	1.90 to 2.00
Galvanized nails.....	3.95 to 4.05

	Base per Lb.
Polished staples.....	2.35c. to 2.45c.
Galvanized staples.....	2.60c. to 2.70c.
Barbed wire, galvanized.....	2.55c. to 2.65c.
Annealed fence wire.....	2.05c. to 2.15c.
Galvanized wire, No. 9.....	2.50c. to 2.60c.
Woven wire fence (per net ton to re-tailers).....	\$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage.....	2.20c. to 2.30c.
Spring wire.....	3.30c.

	Base per Lb.
Wire nails.....	\$1.95 to \$2.05
Annealed fence wire.....	2.30c. to 2.40c. (lb.)
Bright hard wire to manufacturing trade.....	2.25c. to 2.35c.

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh.....	1.90c. to 2.00c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.00c. to 2.10c.
No. 10, blue annealed, del'd Phila.....	2.19c. to 2.29c.
No. 10, blue annealed, B'ham.....	2.05c. to 2.10c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh.....	2.05c. to 2.15c.
No. 13, f.o.b. Chicago dist.....	2.15c. to 2.25c.
No. 13, del'd Philadelphia.....	2.34c. to 2.44c.
No. 13, blue annealed, B'ham.....	2.20c. to 2.25c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.35c. to 2.45c.
No. 24, f.o.b. Chicago dist. mill.....	2.45c. to 2.55c.
No. 24, del'd Philadelphia.....	2.64c. to 2.74c.
No. 24, f.o.b. Birmingham.....	2.50c. to 2.55c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh.....	3.60c.
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Galvanized

No. 24, f.o.b. Pittsburgh.....	2.90c. to 3.00c.
No. 24, f.o.b. Chicago dist. mill.....	3.00c. to 3.10c.
No. 24, del'd Cleveland.....	3.08½c. to 3.18½c.
No. 24, del'd Philadelphia.....	3.24c. to 3.29c.
No. 24, f.o.b. Birmingham.....	3.15c.

Continuous Mill Sheets

No. 10 gage.....	1.75c.
No. 13 gage.....	1.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.65c. to 2.70c.
No. 28, f.o.b. Chicago dist. mill.....	2.75c. to 2.80c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	3.30c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	3.35c. to 3.45c.
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Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.70c.
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Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills.....	\$5.00
Standard cokes, f.o.b. Gary.....	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.30	25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00	40-lb. coating I.C. 17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.	Alloy Differential
S.A.E. Series	
2000 (¼% Nickel).....	\$0.25
2100 (1¼% Nickel).....	0.55
2300 (3¼% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¼c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ¾ in. and larger.....	\$2.80
Spikes, ½ in. and larger.....	2.80

Spikes, boat and barge.....	\$3.00
Tie plate, steel.....	1.95
Angle bars.....	2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Steel		Iron	
Inches	Black	Inches	Black
1½.....	47	2½.....	23
2.....	53	3.....	28
2½.....	58	3½.....	28
3.....	62	4.....	31
3½.....	64	4½.....	31
4.....	64	5.....	35
4½.....	64	5½.....	35
5.....	64	6.....	35
5½.....	64	6½.....	35
6.....	64	7.....	35
6½.....	64	7½.....	35
7.....	64	8.....	35
7½.....	64	8½.....	35
8.....	64	9.....	35
8½.....	64	9½.....	35
9.....	64	10.....	35
9½.....	64	10½.....	35
10.....	64	11.....	35
10½.....	64	11½.....	35
11.....	64	12.....	35
11½.....	64	12½.....	35
12.....	64	13.....	35
12½.....	64	13½.....	35
13.....	64	14.....	35
13½.....	64	14½.....	35
14.....	64	15.....	35
14½.....	64	15½.....	35
15.....	64	16.....	35
15½.....	64	16½.....	35
16.....	64	17.....	35
16½.....	64	17½.....	35
17.....	64	18.....	35
17½.....	64	18½.....	35
18.....	64	19.....	35
18½.....	64	19½.....	35
19.....	64	20.....	35
19½.....	64	20½.....	35
20.....	64	21.....	35
20½.....	64	21½.....	35
21.....	64	22.....	35
21½.....	64	22½.....	35
22.....	64	23.....	35
22½.....	64	23½.....	35
23.....	64	24.....	35
23½.....	64	24½.....	35
24.....	64	25.....	35
24½.....	64	25½.....	35
25.....	64	26.....	35
25½.....	64	26½.....	35
26.....	64	27.....	35
26½.....	64	27½.....	35
27.....	64	28.....	35
27½.....	64	28½.....	35
28.....	64	29.....	35
28½.....	64	29½.....	35
29.....	64	30.....	35
29½.....	64	30½.....	35
30.....	64	31.....	35
30½.....	64	31½.....	35
31.....	64	32.....	35
31½.....	64	32½.....	35
32.....	64	33.....	35
32½.....	64	33½.....	35
33.....	64	34.....	35
33½.....	64	34½.....	35
34.....	64	35.....	35
34½.....	64	35½.....	35
35.....	64	36.....	35
35½.....	64	36½.....	35
36.....	64	37.....	35
36½.....	64	37½.....	35
37.....	64	38.....	35
37½.....	64	38½.....	35
38.....	64	39.....	35
38½.....	64	39½.....	35
39.....	64	40.....	35
39½.....	64	40½.....	35
40.....	64	41.....	35
40½.....	64	41½.....	35
41.....	64	42.....	35
41½.....	64	42½.....	35
42.....	64	43.....	35
42½.....	64	43½.....	35
43.....	64	44.....	35
43½.....	64	44½.....	35
44.....	64	45.....	35
44½.....	64	45½.....	35
45.....	64	46.....	35
45½.....	64	46½.....	35
46.....	64	47.....	35
46½.....	64	47½.....	35
47.....	64	48.....	35
47½.....	64	48½.....	35
48.....	64	49.....	35
48½.....	64	49½.....	35
49.....	64	50.....	35
49½.....	64	50½.....	35
50.....	64	51.....	35
50½.....	64	51½.....	35
51.....	64	52.....	35
51½.....	64	52½.....	35
52.....	64	53.....	35
52½.....	64	53½.....	35
53.....	64	54.....	35
53½.....	64	54½.....	35
54.....	64	55.....	35
54½.....	64	55½.....	35
55.....	64	56.....	35
55½.....	64	56½.....	35
56.....	64	57.....	35
56½.....	64	57½.....	35
57.....	64	58.....	35
57½.....	64	58½.....	35
58.....	64	59.....	35
58½.....	64	59½.....	35
59.....	64	60.....	35
59½.....	64	60½.....	35
60.....	64	61.....	35
60½.....	64	61½.....	35
61.....	64	62.....	35
61½.....	64	62½.....	35
62.....	64	63.....	35
62½.....	64	63½.....	35
63.....	64	64.....	35
63½.....	64	64½.....	35
64.....	64	65.....	35
64½.....	64	65½.....	35
65.....	64	66.....	35
65½.....	64	66½.....	35

Fabricated Structural Steel

New Projects of 41,000 Tons Include 17,700-Ton Bridge and Awards of 37,500 Tons, 17,000 Tons for Subway

NEW projects requiring fabricated structural steel advanced this week to a total of 41,000 tons from only 23,500 tons a week ago. Much of this total was in a bridge across the Missouri River for the Wabash Railway requiring 17,700 tons, a viaduct on Ogden Avenue, Chicago, 7000 tons, a post office in Kansas City, Mo., 4000 tons, and a junior high school in Chicago, 4000 tons.

Awards of 37,500 tons this week were larger than a week ago, when the total was 29,500 tons. Included in this week's total was 17,000 tons for two sections of subway in New York, 8000 tons for a bank building at Twelfth and Market Streets, Philadelphia, and 1000 tons for a continuation school in the Bronx, New York. Awards follow:

North Atlantic States

BOSTON, 800 tons plates, 48-in. welded pipe, for city, to Lukens Steel Co.

PROVIDENCE, R. I., 131 tons, Jewish home, to Providence Steel & Iron Co.

PORTLAND, ME., 120 tons, canopy for Portland Terminal Co., to Boston Bridge Works, Inc.

NEW YORK, 1000 tons, continuation school in Bronx, to Harris Structural Steel Co.

NEW YORK, 650 tons, inspection shed at 205th Street for Board of Transportation, to Hedden Iron Construction Co.

NEW YORK, 450 tons, telephone building on Trattman Avenue, to Hedden Iron Construction Co.

NEW YORK, 17,000 tons, subway: 9700 tons for route 108, section 9, and 7300 tons, route 107, section 9, both to American Bridge Co.

KATONAH, N. Y., 125 tons, grade crossing elimination, to American Bridge Co.

LACKAWANNA, N. Y., 1940 tons, grade crossing elimination, to Bethlehem Steel Co.

OIL CITY, PA., 450 tons, National Transit Pump & Machine Co., to Rogers Structural Steel Co.

PHILADELPHIA, 8000 tons, bank building at Twelfth and Market Streets, to American Bridge Co.

DELAWARE, LACKAWANNA & WESTERN RAILROAD, 245 tons, highway span at Painted Post, N. Y., to Phoenix Bridge Co.

The South

ROCKPORT, KY., 700 tons, Illinois Central bridge, to Virginia Bridge & Iron Co.

Central States

GRAND RAPIDS, MINN., 500 tons, Blandin Paper Co., to Minneapolis-Moline Power Implement Co.

CHICAGO, 700 tons, Verdi School, to Wend-nagel & Co.

Western States

SAN FRANCISCO, 200 tons, apartment building, Sacramento and Gough Streets, to Golden Gate Iron Works.

LOS ANGELES, 700 tons, plates, additional, for 38 and 51-in. welded steel pipe for city, to Western Pipe & Steel Co.

BURBANK, CAL., 125 tons, studios for First National Studios, to Minneapolis-Moline Power Implement Co.

OLYMPIA, WASH., 200 tons, Snoqualmie

River bridge, to Isaacson Iron Works.

OLYMPIA, 200 tons, plates and shapes, steel tank and tower, to Pittsburgh-Des Moines Steel Co.

MARE ISLAND, CAL., 3000 tons, plates, for cruiser, to an unnamed bidder.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

DANNEMORA, N. Y., 350 tons, building for Clinton Prison.

STATE OF MARYLAND, 150 tons, highway bridges.

BALTIMORE, 2300 tons, Enoch Pratt Library; previously reported at 1000 tons, Wheeling Structural Steel Co., low bidder.

Central States

WABASH RAILWAY, 17,700 tons, bridge across Missouri River at St. Charles, Mo.

KANSAS CITY, Mo., 4000 tons, Post Office.

CHICAGO, 3000 tons, World's Fair electrical group.

CHICAGO, 4000 tons, junior high school.

CHICAGO, 1000 tons, transmission towers in Wisconsin and Texas.

CHICAGO, 320 tons, public school.

CHICAGO, 7000 tons, Ogden Avenue viaduct.

Western States

COLUMBUS, NEB., 600 tons, bridge.

DENVER, 243 tons, tanks for United States Bureau of Reclamation; Pittsburgh-Des Moines Steel Co., low bidder.

CHELAN, WASH., 1300 tons, plates, 4 to 30-in. welded steel pipe line for Howard Flat Irrigation District; bids opened.

BREMERTON, WASH., 200 tons, second warehouse for Navy Yard; bids opened.

SACRAMENTO, CAL., 787 tons, bridge across Feather River at Polga; Pomeroy Co., general contractor.

Reinforcing Steel

Road Work in Illinois Will Take 3000 Tons

REINFORCING steel awards the past week totaled 2400 tons compared with 920 tons in the previous week. New inquiries call for 8200 tons, 3000 tons of which will be used for road work in Cook County, Ill., for which bids will be called Jan. 12. Awards follow:

MOUNT VERNON, N. Y., 100 tons, pumping plant, to Tidewater Structural Materials Corp.

AUBURN, N. Y., 250 tons, prison, to Milton Mfg. Co.

WHITE PLAINS, N. Y., 100 tons, bridge, Westchester County Park Commission; placed by A. Riegel & Sons, Inc., White Plains, with Truscon Steel Co.

PHILADELPHIA, 400 tons, factory building for Philadelphia Storage Battery Co., to Concrete Steel Co.

SPARTANBURG, S. C., 150 tons, Post Office, to Connors Steel Co.

AGNEW, CAL., 250 tons, hospital, to Concrete Engineering Co.

LOS ANGELES, 200 tons, theater, Wilshire and Western Avenues, to an unnamed bidder.

SAN FRANCISCO, 800 tons, Pier 23, to Soule Steel Co.

SAN FRANCISCO, 137 tons, warehouse, Fifteenth and Harrison Streets, to Truscon Steel Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

FORT LEE, N. J., 500 tons, approach to Hudson River bridge; bids to be taken by Port of New York Authority Jan. 5.

BROOKLYN, 1400 tons, subway route 107, section 9; Marcus Contracting Co., New York, low bidder.

NEW LONDON, CONN., 600 tons, Coast Guard armory; Murch Brothers, St. Louis, low bidders on general contract.

STATE OF NEW JERSEY, 300 tons, highway route 10, section 1; general contract bids taken Dec. 22.

STATE OF NEW JERSEY, 250 tons, highway route 1, section 2; general contract awarded to Joseph Kinzley Co., Hackensack, N. J.

BOWMANVILLE, N. Y., 100 tons, grade crossing elimination for New York Central Railroad.

WASHINGTON, 600 tons, Dupont Circle Hotel; bids on general contract in.

WASHINGTON, 125 tons, warehouse for E. G. Schafer & Co., Inc., plumbers; R. P. Whitty, general contractor.

WASHINGTON, 250 tons, National Shrine of Immaculate Conception; McClosky & Co., Philadelphia, general contractors.

HAMMOND, IND., tonnage being estimated, City Hall.

CHICAGO, 200 tons, express building for Chicago, Burlington & Quincy Railroad.

CHICAGO, 3000 tons, Ogden Avenue link; previously reported at 2400 tons.

COOK COUNTY, ILL., 3000 tons, paving; bids to be opened Jan. 12.

STATE OF LOUISIANA, tonnage not stated, highway program.

OKLAHOMA CITY, 100 tons, Post Office.

MEMPHIS, TENN., 220 tons, Veterans' Hospital.

PHOENIX, ARIZ., 645 tons, bridge on Benson-Vall Highway; bids opened.

SACRAMENTO, CAL., 159 tons, highway work in Santa Barbara County; bids opened.

Wide-Flange Beam Mill Starts Operations

CHICAGO, Dec. 22.—The Illinois Steel Co. made its first rolling of Carnegie wide-flange beams at South Works, South Chicago, Dec. 20.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Higher—Tin Advances—Lead Firm—Zinc Dull

NEW YORK, Dec. 22.

Copper

On Thursday, Dec. 18, Copper Exporters, Inc., reduced its quotation from 10.80c. to 10.30c., c.i.f., usual European ports. Since then sales have been in good volume, much better than during the first half of the month. They are, however, still far below the large volume of November. Some of the custom smelters a week ago were selling electrolytic copper at 10c., delivered in the Connecticut Valley, and they continued to do so until today, when they advanced their price to 10.25c., at which some sales are reported. It is expected that by tomorrow the foreign price will be advanced to 10.55c. Primary producers are entirely out of the market, leaving what business there is, both foreign and domestic, to custom smelters. It is hoped that this procedure will enable custom smelters to dispose of their current intake. Thus far this month domestic buying has been on a very small scale, most consumers being covered well into next year, or at least through March. Based on the record of the last few months, foreign consumers should buy considerable metal for this and next month. Lake copper is very inactive and is more or less nominal at 10c. to 10.12½c., delivered.

Tin

Prices for Straits tin have been advancing since the lowest point in over 25 years was reached on Dec. 13. On the advance, good business has been done, with consumers the principal buyers. Sales have been largely for forward delivery, with most of the deliveries specified for the second quarter of next year. Prices here today are ¼c. higher than the low point referred to, with spot Straits quoted at 25.37½c., New York. Prices in London today are sharply up from those of Dec. 16, with spot standard quoted at £114 2s. 6d., future standard at £115 10s. and spot Straits at £118 2s. 6d. The Singapore quotation today is £113 12s. 6d. Stocks in British storehouses on Dec. 20 were 22,654 tons, a decline of 12 tons from the week before. Shipments of metal from the Straits to Dec. 20 inclusive, have been 5204 tons.

Lead

Conditions have changed little. Prices are firm at 4.95c., St. Louis, or 5.10c., New York, the latter being the contract price of the leading in-

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY					
	Dec. 22	Dec. 20	Dec. 19	Dec. 18	Dec. 17
Lake copper, New York.....	10.12½	10.12½	10.12½	10.12½	10.62½
Electrolytic copper, N. Y.*.....	10.00	9.75	9.75	9.75	9.75
Straits tin, spot, N. Y.	25.37½	....	24.50	23.87½	23.87½
Zinc, East St. Louis.....	4.05	4.00	4.00	4.00	4.00
Zinc, New York.....	4.40	4.35	4.35	4.35	4.35
Lead, East St. Louis.....	4.95	4.95	4.95	4.95	4.95
Lead, New York.....	5.10	5.10	5.10	5.10	5.10

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

terest. Demand continues light and confined to carload and small lots which call for immediate shipment. Bookings for January have been exceedingly small, so that the backlog of orders is the strong feature of the market.

Zinc

No sales of prime Western zinc are noted below the 4c. level established early last week. Inquiry has improved, but most sellers are averse to doing business at the present prices. Prompt and December deliveries are firmer at 4.05c., East St. Louis, and 4.40c., New York, but metal is scarce at these levels. For January and February a slight premium rules. Sentiment in the market

is that statistically, at least, the worst is over.

Antimony

In a slightly firmer market, Chinese metal is quoted at 7.10c. for prompt delivery, New York, duty paid, with futures at 6.87½c.

Nickel

According to long established prices, ingot nickel in wholesale lots is quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Non-Ferrous Metals at Chicago

CHICAGO, Dec. 22.—Quotations on copper are lower but tin has advanced rather sharply. Sales are sluggish

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass.....	17.67½c.
Copper, hot rolled, base sizes.....	20.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	22.25c.
Seamless Tubes—	
Brass	22.50c.
Copper	21.75c.
Brass Rods	15.87½c.
Brazed Brass Tubes.....	25.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.75c. to 10.25c.
Zinc sheets, open.....	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	27.00c. to 28.00c.
Tin, bar	30.00c. to 31.00c.
Copper, Lake.....	11.50c. to 12.00c.
Copper, electrolytic.....	11.25c. to 11.75c.
Copper, casting.....	11.00c. to 11.50c.
Zinc, slab	5.75c. to 6.75c.
Lead, American pig.....	6.00c. to 7.00c.
Lead, bar	8.00c. to 9.00c.
Antimony, Asiatic	9.50c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	24.00c. to 25.00c.
Alum. ingots, No. 12 alloys	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ⅓	19.00c. to 20.00c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	29.00c.
Tin, bar	31.00c.
Copper, Lake	11.13c.
Copper, electrolytic.....	11.13c.
Copper, casting	10.75c.
Zinc, slab	5.50c. to 5.75c.
Lead, American pig.....	5.75c. to 6.00c.
Lead, bar	8.50c.
Antimony, Asiatic	11.50c.
Babbitt metal, medium grade.....	15.25c.
Babbitt metal, high grade.....	33.50c.
Solder, ½ and ⅓	19.25c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.25c.	9.25c.
Copper, hvy. and wire	8.00c.	9.25c.
Copper, light and bottoms	7.00c.	8.00c.
Brass, heavy.....	4.75c.	6.00c.
Brass, light	3.75c.	5.00c.
Hvy. machine composition	7.00c.	8.25c.
No. 1 yel. brass turnings	4.75c.	5.50c.
No. 1 red brass or compos. turnings..	6.75c.	7.75c.
Lead, heavy	4.00c.	4.50c.
Lead, tea	2.50c.	3.00c.
Zinc	2.25c.	2.75c.
Sheet aluminum	7.50c.	9.50c.
Cast aluminum.....	5.00c.	7.50c.

and inquiries are light. The old metal market is without feature.

Prices per lb. in carload lots: Lake copper, 10.12½c. to 10.25c.; tin, 26.25c.; lead, 5.05c.; zinc, 4.15c.; in less-than-carload lots, antimony, 8.25c. On old metals we quote copper wire, crucible shapes and copper clips, 7.75c.; copper bottoms, 6.75c. to 7.25c.; red brass, 6.75c. to 7.25c.; yellow brass, 4.75c. to 5.25c.; lead pipe, 3.75c. to 4c.; zinc, 1.25c. to 1.50c.; pewter, No. 1, 14.75c.; tin-foil, 15.75c.; block tin, 21.75c.; aluminum, 6.25c. to 6.75c.; all being dealers' prices for less-than-carload lots.

Foundry Equipment Orders Fall, Shipments Gain

Shipments of foundry equipment increased in November over those for October, but new orders declined, and there was consequently a decline also in the amount of unfilled business, according to reports received by the Foundry Equipment Manufacturers' Association from 20 members.

Taking 100 to represent the average monthly shipments for 1922, 1923 and 1924, the November index figure for shipments was 76.5, compared with 62 in October and a high point for the year of 223.6 in January. Orders stood at 45.3 in November, against 50 in October. The three months' moving average at the end of November was 62.1 and a month before it was 75.4. Unfilled orders dropped to 124.9, compared with 159.1 at the end of October.

New Six-Cylinder Car Built By Opel Works

HAMBURG, GERMANY, Dec. 16.—The production program for 1931 of the Opel Motor Works, German subsidiary of the General Motors Co., is 150,000 passenger and commercial vehicles. About one-third of the total output will be sold in Germany and two-thirds for export through the export organization of the General Motors Co. The Opel works has recently brought out a new six-cylinder car with 1.8 liter cylinder volume, which sells for 3175 m. (about \$918), the lowest-priced six-cylinder motor car being built in Europe. At present some 24 American engineers and other technical men are aiding in operating the Opel works.

Iron Ore Census Report for 1929 Issued

The Bureau of the Census announces that, according to data collected in the Census of Mines and Quarries, the production of iron ore in the United States in 1929 by companies engaged in the mining of this ore amounted to 73,936,641 gross tons, valued at \$200,129,695. This value represents the f.o.b. mine value as reported by the operating companies. As compared with the last preced-

ing census year, 1919, these figures represent an increase in tonnage of 20.9 per cent and a decrease in value of 8.2 per cent.

The leading State in the production of iron ore was Minnesota, with an output of 46,815,207 tons—more than the combined output of all other States. Those ranking next in order were as follows: Michigan, 15,238,409; Alabama, 6,424,478; Wisconsin, 1,618,093; Pennsylvania, 1,093,133; and New York, 823,327.

The term "iron ore" as used here covers manganiferous and ferruginous ores and a small percentage of a variety used as a pigment in the manufacture of metallic paint.

The iron-mining companies reported the employment, in 1929, of 28,298 wage-earners (average for the year), to whom were paid wages amounting to \$41,022,180. The cost of supplies, fuel and purchased electric current was \$28,403,740; and \$10,054,794 was reported as having been expended for development work by operating companies.

Pineapple Water Tank 41 Ft. High Made of Steel Plates

AN unusual piece of fabrication recently undertaken by the Chicago Bridge & Iron Works at its Greenville, Pa., plant, was a 100,000-gal. tank by which the Hawaiian Pine-



apple Co., Honolulu, advertises its product. This water tank was made of ordinary tank steel plates riveted in place. The leaves of the pineapple were cut from steel plates, shaped and riveted in a cluster. The tower is painted a light color, and natural pineapple colors are reproduced on the shell of the tank.

This tank is mounted on a three-story office and warehouse building, the topmost leaves reaching to a height of 196 ft. above the ground. The distance from the roof to the underside of the tank is 80 ft. The overall height of the tank proper is 41 ft. 4¼ in., and the maximum diameter of the shell is 24 ft. 4 in. The leaves reach 21 ft. 6 in. above the top of the tank.

Erected near the seashore, this tank is plainly visible from the famous Waikiki beach and from ships approaching the port. Because of its high visibility, the United States Coast and Geodetic Survey has become interested in the use of this tank as a distinctive landmark to aid ships in locating for anchorage outside of Honolulu Harbor.

Railroad Equipment

New York Central Orders 50 Locomotives

Outstanding in railroad equipment business of the week are orders placed by the New York Central for 50 locomotives, 40 to be built by the American Locomotive Co. and 10 by the Lima Locomotive Works. The Bessemer & Lake Erie is inquiring for 1000 to 1200 steel hopper cars. Details of the week's business follow:

New York Central has placed orders for 50 Hudson-type locomotives, 40 to be built by American Locomotive Co. and 10 by Lima Locomotive Works.

Bessemer & Lake Erie is in the market for 1000 to 1200 90-ton steel hopper cars.

Missouri-Kansas-Texas will build 25 caboose cars in its own shops.

Fruit Growers' Express is inquiring for 20 steel underframes for refrigerator cars.

Canadian Pacific has ordered 250 refrigerator cars from National Steel Car Co.

North American Car Corp., Chicago, is building in its own shops 50 mechanical refrigerator cars, which are to be leased to industries or railroads.

Board of Transportation, New York, will soon inquire for 26 miscellaneous service cars.

Santa Fe has ordered two cafe cars from Pullman Car & Mfg. Corp.

City of Chicago has ordered one hopper car from Mount Vernon Car Mfg. Co.

American Monorail Co., Cleveland, has given to the Riley Engineering & Supply Co., Ltd., Toronto, the exclusive rights for the manufacture and sale in Canada of American Monorail overhead conveying equipment.

December Motor Car Output at Low Point; Ford Shut Down

DETROIT, Dec. 22.

DETROIT is rubbing its eyes at the spectacle of the Chevrolet company producing twice as many cars this month as Ford. This is the first time since operations on the model A got under way on a big scale that Ford has yielded the lead in output to Chevrolet. Preliminary estimates put Ford's December assemblies at less than 30,000 units as against some 60,000 for Chevrolet.

All manufacturing divisions at the Rouge works, including the steel mill, went down at midnight on Dec. 17 to remain inactive until Jan. 5. This represents a shutdown of two and a half weeks. Although Ford's suspension is for inventory purposes, it is said that its dealers are stocked with about a month's supply of cars as measured by current retail figures. The plant of the Ford Motor Co. of Canada, Ltd., also is down until Jan. 5.

Reports still are being freely circulated in regard to Ford's future plans. One which seems fairly well authenticated is that Mr. Ford would like to dispose of the present Lincoln plant and transfer the manufacture of the Lincoln to Highland Park. It is said that some Lincoln parts are now being produced at the Rouge plant, and this practice may be continued indefinitely. If this plan for the Lincoln materializes, and the proposed eight-cylinder Ford is made at Highland Park, that municipality is destined to return to the prosperity of its earlier days prior to removal of Ford operations to Dearborn.

Ford Suppliers Hard Hit

SUSPENSION of Ford activities has hit hard a number of suppliers, including the Briggs Mfg. Co. and the Murray Body Corp., both of which have large Ford contracts. In many cases companies have been compelled practically to discontinue operations for a period corresponding to the shutdown at the Rouge plant. Under the circumstances it is easy to visualize the far-reaching effects of Ford's action.

Ford is not alone in its decision to close down. The Buick plant at Flint has stopped production until after Jan. 1, while Studebaker and Auburn are just resuming assemblies after a two weeks' vacation. With the exception of Hudson-Essex, which is maintaining a schedule of more than 2000 cars a day, automobile factories

December output of motor cars in United States and Canada likely to be 100,000 to 110,000 units, a new low mark.

* * *

Chevrolet's production this month will be twice that of Ford. This is the first time Chevrolet has passed Ford since the latter started to make Model A cars on large scale.

* * *

Studebaker's free wheeling being adopted by Lincoln, Auburn and Hupp, with predictions that others will take it up.

* * *

All-aluminum engine of new Marmon 16 will have power-weight ratio comparable to that of present-day airplane motors.

are going along at a slow pace. A month ago observers had hoped that the December output would exceed the 125,499 units in the same month of 1929, but the poor showing of the Ford Motor Co. and others makes this unlikely. The month's figures are now estimated at 100,000 to 110,000, by far the lowest point reached since 1921. It is interesting to note that production in the United States and Canada in the final quarter of 1930 will be approximately 390,000 cars, which is less than that in any single month of 1929, with the exception of November and December.

Chevrolet Employing 30,000

WHILE Chevrolet officials are issuing optimistic statements about the reception of the 1931 models, and admittedly there has been a surprisingly good retail demand, Detroit feels that it still is a little early to pass final judgment. In view of the continued business depression, however, the opinion is that Chevrolet is in an unusually strong position and has been taking considerable business which previously had gone to Ford. Detroit is appreciative of the fact that Chevrolet's decision to bring out its new line six to eight weeks earlier than usual has given employment to some 30,000 people at a time when the city badly needed this support.

In line with its policy of reducing dealers' stocks to a minimum and manufacturing only enough cars to meet customers' demands, General Motors sold 32,313 more cars to users in the first 11 months of this year than it sold to dealers. November sales to dealers in the United States totaled 48,115, compared with 39,745 in November, 1929. This is the first month in 1930 that sales to dealers have shown an increase over the corresponding period of last year. Chevrolet's introduction of its new models earlier than usual was responsible for this good showing.

THE announcements that the new Martin midget car is in production at Hagerstown, Md., and that the newly organized De Vaux Motors Corp. will manufacture a car at the plant of the Hayes Body Corp. at Grand Rapids, Mich., have caused little comment in Detroit. The old line companies are so firmly entrenched and are offering the automobile buyer so much for his dollar that they do not believe that the newcomers will be serious competitors. The motor for the new De Vaux car will be made at Muskegon by the Continental Motors Corp. It is significant that the De Vaux company has no stock for sale and has ample financial support.

Free Wheeling Gains Popularity

IF 1930 has brought an outstanding mechanical development in the automobile industry, it is free wheeling. First introduced by Studebaker late in the summer, it has been adopted by Lincoln and will be incorporated in the new Hupp and Auburn models. The extension of the use of this feature has been made possible through the pooling of patents whereby Borg-Warner will manufacture this transmission. Its early adoption by other makers is predicted in Detroit. It is said that free wheeling was first offered by the inventor to a large Detroit automobile company, which did not foresee its possibilities and refused it. Studebaker then took hold of it and made it the main selling point in its current campaign.

Since Chevrolet's introduction of its 1931 line, people have been wondering what the new Pontiac and Oakland will be like. It is predicted that the Pontiac will have a longer wheelbase, wire wheels as standard equipment, a considerable number of motor refinements and a sturdier frame.

Oakland is likely to have the synchromesh transmission now found in the Buick and first used by Cadillac. Both cars are to have a base price less than that of any previous model. It is understood that for the first time the body side panels will be built in single units. Chromium plating will be freely applied as it is on the Chevrolet.

Marmon to Use Aluminum Engine

PROBABLY the most interesting part of the Marmon 16, to be introduced the first of the year, is the all-aluminum engine capable of developing 200 hp., or the extraordinary ratio of 1 hp. to each 4.65 lb. of engine weight, which is comparable to the power-weight ratio of present-day airplane motors. It is no heavier than the ordinary eight-cylinder engine and consists of virtually two straight-eight engines placed together at an angle of 45 deg. Heat-treated aluminum alloys weigh two and a half times less than cast iron, are exceptionally tough and wear resisting and transmit heat

three times as fast as cast iron. These are the reasons given by the Marmon company for using aluminum alloys, which are much more costly than cast iron. An aluminum alloy with a tensile strength after heat treatment of 30,000 to 35,000 lb. per sq. in. is used in the cylinder block and crankcase. Among the constituents of this alloy are copper, iron and silicon, with copper the major ingredient of the three. In the cylinder heads a closer grained aluminum alloy is employed with tensile strength of 29,000 to 32,000 lb. per sq. in. It contains a large percentage of copper and a small amount of magnesium is added to the iron and silicon.

IN line with its policy of concentrating the manufacture of Chrysler-made cars at the Jefferson Avenue plant of the Chrysler Corp. and at the Dodge factory, with the Highland Park plant reserved for the service department, Chrysler has already taken steps to move its department producing service parts from Dayton, Ohio, to Highland Park.

Steel Corporation Heads Visit Worcester Plant

James A. Farrell, president, and Myron C. Taylor, chairman of the finance committee of the United States Steel Corp., and John S. Keefe, president, American Steel & Wire Co., with other high officials, made an inspection of the Worcester Works of the American Steel & Wire Co. on Dec. 17. An important event of the day was a luncheon given at the Worcester Club by President Keefe, at which were present as guests a large group of men representative of the industrial, commercial, financial and civic life of Worcester. There were also present the heads of the three railroads which serve Worcester—President J. J. Pelley of the New York, New Haven & Hartford, President Edward S. French of the Boston & Maine, and Vice-president Howard M. Biscoe of the New York Central, operating head of the Boston & Albany.

President Keefe presided at the luncheon and there were informal addresses by President Farrell and Chairman Taylor for the Steel Corporation, President Keefe for the American Steel & Wire Co., Mayor Michael J. O'Hara for the city of Worcester, Dr. Homer Gage, president of the Crompton & Knowles Loom Works, for the city's community and civic life, and Harry G. Stoddard, vice-president and treasurer of the Wyman-Gordon Co., Inc., for Worcester's industries.

The Worcester affair was in line with the policy of the high executives of the Steel Corporation that they visit occasionally the plants of its subsidiaries, in order that they may have personal knowledge of them and the

men who operate them, and also that they may have some personal acquaintance with leading men of the communities in which the plants are located. It was with this latter end in view that the luncheon was given.

Others in the visiting party besides President Farrell, Chairman Taylor and President Keefe were Vice-presidents Eugene P. Thomas, A. N. Diehl and John Hulst of the Steel Corporation; and, from the American Steel & Wire Co., C. F. Blackmer, vice-president and general superintendent; D. A. Merriman, vice-president and general sales manager; J. A. Coakley, vice-president and general traffic manager; J. Lester Perry, district manager of the Worcester district, and Clifford F. Hood and Malcolm W. Reed, assistant district managers; Peter Stewart, superintendent of South and Central Works, and A. J. Hoyt, superintendent of North Works.

The French scientist Louis Lumiere is said to have invented a metal film for motion pictures, according to a report from Paris to the Department of Commerce. The film is said to be more durable and resistant to wear than the type now in use and of equal lightness and efficiency. M. Lumiere began his investigations to develop a stronger material for positive films.

The Philadelphia office of the Perry-Buxton-Doane Co., Boston, dealer in iron and steel scrap, will be closed Jan. 1, and all business will be handled from the New York branch office at 50 Church Street. J. B. Hecht, who has been connected with the Philadelphia office for the past six years, will join P. W. Bowers in New York.

Electrical Manufacturing Industry's Problems

At the next monthly meeting of the New York chapter of the American Society for Steel Treating, scheduled for Monday evening, Jan. 12, T. S. Fuller, metallurgist, General Electric Co., Schenectady, N. Y., will deliver an address on "Metallurgical Problems of the Electrical Manufacturing Industry." The meeting will be held in the assembly room of the Manufacturers' Association of New York, in the Woolworth Building.

Railroads Scrap 4,500,000 Tons in 1929 Is Estimate

Approximately 4,500,000 gross tons of scrap iron and steel was produced by the railroads of the United States last year, it is estimated by the research bureau of the Institute of Scrap Iron and Steel, on the basis of returns by the railroads to the institute.

The methods of disposition by the railroads of their scrap supplies are indicated in the survey. Of a total of 1,800,915 tons, reported by a group of railroads, 1,030,523 tons was sold to scrap dealers for processing and disposition on the various markets, 411,169 tons was sold direct to mills and other consumers of scrap under various arrangements, and 359,223 tons was sold without any division being reported by the railroads. Of the 1,800,915 tons analyzed by the institute, 1,306,835 tons was prepared scrap. Quite a few roads are reclaiming a portion of their scrap and are using it for repair work, either with or without some manufacturing operation.

In order to arrive at an approximate idea of the various classifications of scrap which the railroads place on the market and the relative importance quantitatively of these items, the institute has analyzed the detailed reports of 15 of the larger roads whose figures were made available for this survey. A composite of these 15 reports shows that a total of 1,451,891 tons which these roads sold was graded as follows:

	Gross Tons
Iron arch bars and transoms . . .	17,029
Axles . . .	18,526
Angle and splice bars . . .	23,782
Boilers . . .	19,163
Bolsters and side frames . . .	17,323
No. 1 busheling . . .	4,156
No. 1 cast . . .	28,405
Standard-section T rails . . .	98,931
Other steel rails scrap . . .	216,540
Sheet scrap . . .	43,007
Tires . . .	11,420
Turnings . . .	5,225
Mixed borings and turnings . . .	25,613
Cast iron carwheels . . .	191,277
Other cast scrap . . .	30,460
Couplers, knuckles, coil and leaf springs, rolled steel wheels . . .	44,117
Frogs and switches . . .	14,531
Flues . . .	16,506
Malleable scrap . . .	28,880
No. 1 heavy melting steel . . .	139,354
No. 2 heavy melting steel . . .	20,766
Old iron rails . . .	389
Miscellaneous grades (not otherwise classified) . . .	436,491
Total . . .	1,451,891

PERSONALS

D. A. WILLIAMS, heretofore vice-president in charge of operations of the Continental Steel Corp., Kokomo, Ind., has been elected president, succeeding HENRY A. ROEMER, who resigned recently to become president of the Sharon Steel Hoop Co. Mr. Williams has been actively engaged in many branches of the steel business since 1896. He began his business



D. A. Williams

career in the operating department of the Falcon Iron & Nail Co., subsequently a part of the American Sheet & Tin Plate Co. He later became associated with the New Process Galvanizing Co. and with the Youngstown Sheet & Tube Co. He remained with the Youngstown company until 1913, when he joined the Canton Sheet Steel Co. He left the Canton company in 1919 to assist in the formation of the Superior Sheet Steel Co., of which he became vice-president and general manager. He continued in that capacity until the Superior company consolidated with the Kokomo Steel & Wire Co., and the Chapman Price Steel Co. to form the Continental Steel Corpn.

PHILIP P. GOTT has been made manager of the trade association department of the Chamber of Commerce of the United States. He succeeds HUGH P. BAKER, who resigned to become dean of the New York State College of Forestry. Mr. Gott has been acting manager of the department since Dr. Baker's departure, Sept. 1.

PAUL K. FREESE, engineer and contractor, specializing in inspections and appraisals, has moved his office from Gary, Ind., to the Jackson Park National Bank Building, Chicago.

ASHTON G. BEAN has been elected president of the White Motor Co., Cleveland, to succeed ROBERT W. WOODRUFF, who has become chairman of the board. W. KING WHITE has been added to the board of directors. Mr. White is president of the Cleveland Tractor Co. Mr. Bean is president of the General Industries Co., Elyria, Ohio, manufacturer of parts for telephone equipment, and of the Bishop & Babcock Co., Cleveland, manufacturer of soda fountain equipment.

LOUIS M. VIDAL, for the past six years general sales manager of the Kelvin Engineering Co., New York, has become associated with A. G. Schoonmaker & Sons, Inc., machinery dealer, New York, where he will handle the company's foreign business.

GEORGE H. RUPP, who, since early 1929, has been in charge of iron mines and quarries of the Colorado Fuel & Iron Co., Denver, has been appointed manager of the newly created mining department. He will have charge of all iron mine, coal mine and quarrying operations. Before joining the Colorado company, Mr. Rupp was with the Hecla Consolidated Copper Co. He was graduated from the College of Mines of the University of Michigan in 1911.

J. B. DOWNEY has been appointed district sales representative for Arizona, with office at 2944 North Second Street, Phoenix, for the Dayton-Dowd Co., Quincy, Ill., manufacturer of centrifugal pumping equipment.

DR. H. H. LESTER, research physicist, Watertown Arsenal, will talk on "X-Ray Control of Welding and Casting Technique" at a meeting of the Springfield, Mass., chapter of the American Society for Steel Treating, Jan. 12.

SAM TOUR, consulting metallurgical engineer, New York, spoke at the regular meeting of the Cincinnati chapter of the American Society for Steel Treating, Dec. 11, on "Die Castings."

H. H. ASHDOWN, a well-known British metallurgist, has joined the staff of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., as a metallurgical engineer. Mr. Ashdown has recently been connected with the physical research laboratory of the Illinois Steel Co., South Chicago.

RUSSELL J. CAPLIN, who has been associated with the Niagara Machine & Tool Works, Buffalo, for the past 16 years, has been placed in charge of a new branch office of the company in the General Motors Building, Detroit.

CLAXTON E. ALLEN, who has been manager of the Southwestern district of the Westinghouse Electric & Mfg. Co., with headquarters at St. Louis, has been elected a commercial vice-president of that company, reporting to W. S. RUGG, vice-president in charge of sales. His headquarters will be at East Pittsburgh. Mr. Allen has been associated with the West-



Claxton E. Allen

inghouse company since 1909, and is a graduate of the Virginia Polytechnic Institute. He first served as head of the transformer division of the detail and supply department, and three years later became assistant manager of that department. In 1915 he was attached to the sales department in the New York office, and shortly afterwards was made manager of the supply division and central station division at Chicago. He was made manager of the St. Louis district office in 1922.

Michigan Steel Tube Forms Subsidiary

Charles E. Miller, president and general manager of the Michigan Steel Tube Products Co., Detroit, announces the organization of a subsidiary to be known as the Miller-Shelby Products Division. The new company will have headquarters in Shelby, Ohio, where a plant will be located for the manufacture of parts for aircraft, automobiles and tractors. Motor car accessories and special rolled shapes for architectural purposes will also be produced.

Pangborn Corp., Hagerstown, Md., will open district sales offices in Cincinnati and Milwaukee Jan. 1.

November Sheet Production Lowest in Years

The slackening in the demand for sheet steel during November is reflected in the monthly report of the National Association of Flat Rolled Steel Manufacturers covering independent mills. This shows a rather sharp decline in November in sales, production, shipment and unfilled orders. Production, amounting to 148,550 tons, and shipments of 158,182 tons, were the lowest during any month for several years. Sales amounting to 135,682 tons were also the lowest in several years, except in November, 1929, when they were 134,391 tons, or slightly less than this year. The November report and comparison in net tons follow:

	Novem- ber	Octo- ber	Septem- ber
Sales	135,682	158,700	214,454
Production	148,550	193,934	179,928
Shipments	158,182	193,516	186,639
Unfilled orders	295,282	319,518	388,599
Unshipped orders	88,338	98,189	97,428
Unsold stocks	96,248	91,024	88,363
Capacity per month	504,600	566,600	545,200
Percentage reporting	67.6	67.6	67.6
Percentages, based on capacity			
Sales	39.8	41.4	58.2
Production	43.6	50.6	48.8
Shipments	46.4	50.5	50.7
Unfilled orders	86.6	83.4	105.5
Unshipped orders	25.9	25.6	26.4
Unsold stocks	28.2	23.8	24.0

To Scrap First American Steam Railroad

An Associated Press news item is to the effect that the first railroad in the United States which ever carried a steam locomotive is to be scrapped. This road, built in 1827 by the Delaware & Hudson Co., connects Carbon-dale, Pa., with Honesdale, Pa., by a circuitous road of 23 miles. New State highways place the two towns only 16 miles apart.

Steep grades over the winding course necessitate the use of pusher engines. This fact, together with motor truck competition, has diverted most of the traffic to other roads. As no plan to make continued operation of the road profitable has been evolved, the Delaware & Hudson Co. has decided to abandon the road, tear up the track and dispose of the material to whatever advantage may be possible.

Iron and Steel Exports in November Lowest of Year

WASHINGTON, Dec. 22.—The lowest of the year, exports of iron and steel from the United States in November declined to 111,968 gross tons, against 131,850 tons in October. In the first 11 months of 1930, exports amounted only to 1,883,037 tons, compared with 2,817,110 tons in the corresponding period of last year.

Imports in November increased to 43,095 tons, against 38,344 tons in October. In the first 11 months of the current year, imports dropped to 477,633 tons from 691,433 tons in the corresponding period of last year.

Tin plate was the largest item of

exportation in November, amounting to 13,302 tons. Canada was, as usual, the principal market, taking of all steel products 49,826 tons. The largest item of importation was pig iron, amounting to 18,292 tons.

Pig Iron and Ferroalloys Nearly \$750,000,000 in 1929

Total production of pig iron and ferroalloys in blast furnaces last year amounted to 42,334,284 gross tons, valued at \$746,290,744 (average, \$17.62 a ton) at f.o.b. factory prices, according to the Bureau of the Census. These were increases of 16.8 per cent and 8.4 per cent, respectively, compared with 36,230,420 tons, valued at \$688,641,808 (\$19.01 a ton), reported for 1927, the last preceding Census of Manufactures year.

Last year's output was made up as follows: 32,582,807 tons of pig iron and ferroalloys, with an assigned value of \$547,762,157 (\$16.81 a ton, average), made in blast furnaces and consumed in steel works and rolling mills and foundries under the same ownership as the blast furnaces; and 9,751,477 tons, valued at \$198,528,587 (\$20.36 a ton), produced for sale.

In addition, 220,387 tons of ferroalloys, valued at \$28,655,447, was produced in electric furnaces, increases of 25 per cent and 68.1 per cent, respectively, as compared with 176,272 tons, valued at \$17,049,050, reported for 1927. Unit values were \$130.02 in 1929 and \$96.72 in 1927.

Total production of ferroalloys in 1929, both in blast furnaces and in electric furnaces, amounted to 868,519 tons, valued at \$69,986,850 (average, \$80.58 a ton), against 678,324 tons, valued at \$50,556,637 (\$74.53 a ton), reported for 1927, the rates of increase being 27.9 per cent and 38.4 per cent, respectively.

New Copper Alloy of Wide Hardness Range

Perfection of a formula for manufacturing copper of a predetermined hardness has been announced by the Central Brass & Aluminum Foundry, Cincinnati. For the last year, the four partners, Edward Boland, William Hibner, John De Paoli and E. L. Cunningham, comprising the official personnel of the company, have been working to obtain an alloy which may be made of any hardness.

This new metal may be made in any degree of hardness which the customer may desire, from the softness of brass to the hardness of steel. In addition, it is claimed that it will outwear steel in the ratio of five to one. The metal content is Swiss aluminum, special steel and electrolytic copper. The secret is said to lie in a special chemical formula. It is claimed to be non-corrosive and rustless.

The company has begun the manufacture of gears, bearings, dies and golf club ends of the metal.

Deliveries of Non-Ferrous Ingots in November

CHICAGO, Dec. 22.—The combined deliveries of brass and bronze ingots and billets by the members of the Non-Ferrous Ingot Metal Institute for November amounted to 5470 tons.

Obituary

SAMUEL J. RILEY, superintendent of the Cold Metal Process Co., Youngstown, died Dec. 5, from the effects of injuries incurred in an automobile accident. Mr. Riley was widely known as a mechanical engineer and from 1919 to 1929 served as general superintendent at the Youngstown plants of the United Engineering & Foundry Co., Pittsburgh. He had previously been mechanical engineer for the William Tod Co., which subsequently became a part of the United company. He was 60 years old.

GEORGE H. HELVEY, for years a director of the Hooven-Owens-Rentschler Co., Hamilton, Ohio, died on Dec. 17, aged 78 years. Mr. Helvey, who had been prominent in manufacturing circles for years, also was the inventor of valves used on the Corliss engine. He was born in Cincinnati, and moved to Hamilton with his parents when he was about five years old.

ASA WALTER GRIFFITH, formerly assistant general superintendent of the Carnegie Steel Co. in the Youngstown district, died of pneumonia on Dec. 14, aged 64 years. He was born in Wilmington, Del., and went to Youngstown in 1907 as superintendent of the Upper and Lower Union mills of the Carnegie company. He had previously been connected with the steel industry in Pittsburgh. Mr. Griffith was subsequently appointed assistant general superintendent of the company, but resigned in 1926, because of ill health.

GEORGE S. FLANDERS, for 32 years superintendent of the American Tube Works, Somerville, Mass., died at his home in that city on Dec. 16, aged 86 years. He had been retired for the past 10 years.

ARTHUR W. WILL CUTS, assistant manager of railroad sales for Joseph T. Ryerson & Son, Inc., with headquarters at St. Louis, died suddenly on Dec. 14 when playing golf with three companions at the Woodlawn Country Club, Kirkwood, a suburb. He had been connected with the Ryerson company for 17 years. He was 48 years old.

JOHN LALLY, president of the Lally Column Co., Boston, died on Dec. 4.

St Louis Urges "Build Now"

Industrial Club of That City Advertises to Stimulate Construction Activities

FOLLOWING the issuance of a statement in which the Industrial Club of St. Louis through its director, George C. Smith, declared that the St. Louis district must depend upon a revival of building to bring about a return to normal business conditions, the club published the first of a series of advertisements in St. Louis newspapers for the purpose of bringing about such a revival.

"Let's Bring Back Prosperity Now" is the heading of the first advertisement, which declares that "charity-almshousing, beneficent and necessary though it be, is no cure for the economic evils which assail us." After a preamble, the advertisement declares that "most far-reaching of all useful activities in the restoration of employment is the construction industry," and continues:

"New building, and the extension and repair of existing buildings, create jobs quicker and in a bigger way than anything else. Such activity—when the manufacture and transportation of materials as well as their erection is considered—is about 80 per cent labor. Is it not better to spend money to create such useful jobs than to spend it for 'doles' or charity or the support of an army of idle workers?"

"Today is bargain time in the construction industry. Prices are down about 20 per cent. You can get more now, pay less for it, and have the work done quicker than at any time in recent years. Such a condition is temporary. It cannot last. Already there are signs of a turn. To take advantage of this condition it is necessary to act immediately.

"The directors of the Industrial Club, representative business men of this community, see these facts very clearly. In their own respective businesses they are spending their money liberally—as a matter of good business—to extend manufacturing and warehouse facilities, make repairs, install new machinery and get ready for the upturn of business which is near at hand. In and around their own homes they are likewise doing, at today's prices, all the construction and repair work possible.

"But they are only a few. The situation is open to all. Why not take advantage of it? Entire homes can be built today at bargain prices. The new roof that your present home needs; that reflooring job; the extra bathroom or wider porch you have long desired; the repainting or decorating; the weatherstripping that would save its cost in fuel—these and a hundred things like them would prove a money-saving investment for you and give someone a needed job!

"Here is something definite—something practical and personally profit-

able—that thousands of people can do—now!—to relieve unemployment, and to help bring back prosperity. Do it! Put your home, factory or business building in first-class condition now at bargain rates. See you own architect, builder or contractor today!"

Mr. Smith states that a partial survey by the Bureau of the Industrial Club reveals that building operations in the St. Louis district during 1931 will require expenditures of about \$113,000,000, including \$7,800,000 for Government buildings at St. Louis and Scott Air Field; \$6,000,000 for river improvements; \$7,555,000 for State and county improvements; \$10,970,000 for city, street and sewer improvements; \$6,295,000 for schools and hospitals; \$28,245,000 for 19 other buildings and the Illinois Terminal System improvements, the Bagnell dam project of the Union Electric Light & Power Co., and the pipe line terminal at Cahokia of the Phillips Petroleum Co. These will be increased, he said, by budgets of public utilities and railroads not yet announced.

Lighthouse Service to Rush Building Work

WASHINGTON, Dec. 22.—The Lighthouse Service, Department of Commerce, is rushing plans for a building program which will total over \$2,000,000. The program represents only the normal amount of work provided in the usual annual appropri-

INVENTORY CURTAILMENT PROVED TOO DRASTIC

AS an illustration of how closely manufacturers of basic commodities are sailing to the winds on inventories, the situation that developed last week at the plant of the American Rolling Mill Co., Ashland, Ky., may be typical.

Having curtailed pig iron production, the American Rolling Mill Co. found it necessary to put a furnace back in blast. It was blown in Dec. 16. The Kentucky By-Products Coke Co., which supplies coke for that furnace, did not have a sufficient supply of coke on hand, so it was obliged to start up its coke plant. Its coal inventory also was low, so the company found it necessary to reopen one of its mines.

In this particular instance 100 men found re-employment at the blast furnace, 75 at the coke plant and 350 at the coal mines, a total of 525.

tions, but the Lighthouse Service is attempting to award all contracts and get work started early in 1931. It is pointed out that the early starting of work will lead to the immediate employment of men in nearly all parts of the country and will also result in the increased efficiency of the Lighthouse Service.

The program includes the building of new vessels, the construction of lighthouses and the enlarging of a number of lighthouse depots. Much of the work is already under way, and a number of contracts are pending.

Steel Mill Equipment Business Promising

Domestic steel companies give greater promise of future mill equipment business than those in foreign countries, according to officials of the United Engineering & Foundry Co., Pittsburgh. The large replacement programs planned by steel companies of the United States for the purpose of lowering upkeep and material costs will continue to keep the steel mills of this country far ahead in the standards of production, it was said. While the United Engineering estimating force is busy figuring on new projects, there are few of an export nature among them.

Ludlum Steel Expanding Facilities at Watervliet

H. G. Batcheller, recently elected president of Ludlum Steel Co., Watervliet, N. Y., announces that the Watervliet mill of Ludlum is undergoing extensive alterations to improve its facilities for the production of the special steels introduced by this company in recent years.

Equipment for wire drawing, centerless grinding, heat treating and other finishing operations is being enlarged and modernized, and rolling facilities for special shapes are being extended to supply the demand for non-corrosive steels.

"The carrying out of this program," said Mr. Batcheller, "will entail considerable concentration of tool steel production at the Dunkirk mill and some rearrangement of personnel at the various plants, but will permit of the concentration of equipment and supervision necessary for the development of both types of steel."

Enameled Sheet Metal Ware Shipments Up in October

WASHINGTON, Dec. 22.—Shipments of enameled sheet metal ware in October were 329,337 doz., valued at \$1,326,912, compared with 297,622 doz., valued at \$1,212,368, in September, according to reports received by the Bureau of the Census from 16 manufacturers, representing approximately 80 per cent of the industry.

Machine Tool Trade Looks to 1931

Considerable
Pending Business Awaits
Signs of General Recovery

WITH machine tool business almost at a standstill over the holiday period, the attention of the trade is centered on 1931 prospects, which are found to be fairly encouraging, providing the recovery from the depression is not much longer delayed.

Machine tool trade commonly does not begin to develop substantial gains until the businesses upon which it depends for its orders have experienced a fair degree of improvement. If, as is predicted in many quarters, January should bring a measurable gain in important manufacturing lines, the

machine tool industry may expect that its trend will be markedly upward by April at the latest. During the interim, a slow gain in orders is expected, beginning next month.

There is a considerable amount of prospective business. During the past several months many manufacturers have been making a close study of their equipment needs with an eye to reduction in costs, and have willingly received advice from service departments of the machine tool companies. In a good many instances, prospective purchasers are believed to have virtually decided on the machines they

will want, and they are now awaiting the pick-up in their own business that will give them the stimulus to go ahead with their tentative plans.

Estimates of some machine tool companies are that 1931 will be a better year than 1930, notwithstanding that the first half of this year was fairly good, including, as it did, a large carryover of shipments from 1929.

The opinion prevails, however, that the trend of 1930 may be reversed in the coming year and that the last half probably will be much better than the first half.

New York

Machine tool bookings have continued very light, and no change from this condition is expected during the remaining days of 1930. The thoughts of the machine tool trade are centered on prospects for 1931. There is more or less unanimity of opinion that January will bring a slight gain in orders, but that no substantial improvement can be expected before April. In instances where machine tool companies are in the habit of fixing estimated sales at the beginning of each year, the opinion is said to prevail that 1931 as a whole will show a moderate increase over 1930 in sales totals. The first six months of this year were fairly satisfactory for most companies not only in orders booked, but in shipments. The large shipments during the first half of the year were in part a carryover of business booked in 1929. In 1931, it is believed, the trend will be reversed in that the last half may be much better than the first.

While considerable business is in prospect in this district, the actual placing of it depends in large measure upon the time and extent of general business recovery. If the situation should look considerably more promising in January, a fair number of orders might be closed, according to present indications. Two companies are tentatively seeking a total of about \$80,000 worth of new machine shop equipment, but there is no assurance in these cases, as with many other prospects, that the orders will come through within the near future.

Cleveland

Machine tool orders are still very light and the volume of business this month is barely holding up to that in November. Sales are limited for the most part to single machines and are in the nature of emergency orders from companies that have taken on work requiring the purchase of a new tool. Shops not having immediate need of machinery are deferring purchases. While very little activity is looked for during the remainder of the year, the trade is confident that there will be some gain in orders during January.

Chicago

The Chicago machine tool market is virtually at a standstill. Transactions in recent days have been very few, and as a general rule both new and old inquiries have been deferred for action until after Jan. 1.

It is reported that the Rock Island will issue a list early in the new year and dealers are investigating probable machine tool needs by the Northern Pacific and Great Northern, which have extensive car shop programs. Word is out that the Illinois Steel Co.'s list will not come up again until after Jan. 15.

An increased amount of forging work is reaching Chicago shops from railroads that are expanding equipment building and repairing operations.

New England

Dealers report no sales of importance the past week. With many

plants and shops closing this week until after Jan. 1 for inventory and plant overhauling, little or no business is expected during the remaining days of 1930. The trade takes an optimistic view of the future, however, pointing out that textile machinery makers have already booked orders and are negotiating on other sizable contracts which will place that industry in the best position in about two years. The General Electric Co.'s Lynn and Pittsfield, Mass., plants are known to have a large amount of business on their books to be released early in 1931. The United Shoe Machinery Corp., Boston, is reported to have a very comfortable backlog, while several of the other largest New England industrial plants profess to have enough business in hand, if released, to keep plants running full for several months. All of these concerns have had machine tools under consideration for some months and dealers anticipate orders will be placed early in 1931.

Pittsburgh

The machinery market is without feature, and no activity is expected until after the first of the year. In many cases 1930 appropriations have reverted back to the treasury without purchases, as plant executives are reluctant to make improvements unless actually necessary until business shows signs of clearing. Machine tool organizations are doing considerable sales promotion work which is bringing in orders in a few cases. New inquiry is light, but budgets for

1931 are not abnormally low and the usual amount of buying by the large industrial companies in the district can likely be expected in the first quarter.

Makers of heavy machinery and equipment are reaching the end of a number of large orders taken early in the year and only one or two of the larger interests have much future work on their books. Several large steel mill expansion orders are said to be under negotiation and one or two awards are reported to have been placed quietly.

Cincinnati

Except for a slackening in inquiry, the machine tool market remains unchanged. Checking of inquiries by local manufacturers shows that while some are in abeyance, the greater

percentage are still considered active. However, users indicate that they will do nothing until after the first of the year and then only if general business conditions clear.

A number of local manufacturers are planning to close from Dec. 24 to Jan. 5.

Milwaukee

Dullness pervades the machine tool market and little business is expected until after the holidays. A few orders for single machines for prompt delivery were booked last week, and there was moderately active inquiry, nearly all of which is predicated upon new year needs. Sentiment is steadily becoming more optimistic by the more promising prospects in the foundry and machine shop industries generally.

New York

PROPERTY at 838-40 Greenwich Street, New York, has been leased by Atlas Safety Lock Co., Inc., 215 Seventh Avenue, for new plant. Present building will be remodeled and be ready for occupancy Feb. 1. Company plans expansion at new location.

Rubsam & Hoormann Brewing Co., 191 Canal Street, Stapleton, S. I., has awarded general contract to James McDermott, Stapleton, for new multi-story

beverage and ice-manufacturing plant, to cost close to \$350,000 with machinery. It will replace structures destroyed by fire.

Standard Gas & Electric Co., 111 Broadway, New York, has authorized an expansion and improvement program during 1931 to cost \$43,596,257 in different parts of country. Work will include an addition to steam-operated electric generating plant of Northern States Power Co., Minneapolis, a unit of organization; hydroelectric generating plant for California-Oregon Power Co., Medford, Ore., another subsidiary, and two extensive

steel tower transmission lines in Minnesota Valley district. Company engineering department, address noted, will be in charge.

Edison Electric Appliance Co., 22 West Fifteenth Street, New York, an interest of General Electric Co., Schenectady, is considering an addition to branch plant at Waynesboro, Va., formerly works of W. J. Loth Stove Co., recently acquired, to cost over \$60,000 with equipment.

Board of Education, Port Chester, N. Y., plans installation of manual training equipment in new multi-story high school to cost close to \$1,000,000, for which bids have been asked on general contract. Tooker & Marsh, 101 Park Avenue, New York, are architects.

Board of Transportation, 250 Hudson Street, New York, J. H. Delaney, chairman, has awarded general contract to John T. Brady & Co., 103 Park Avenue, for service, repair and inspection buildings at Concourse yards, at price of \$689,926, exclusive of equipment. Entire project will cost more than \$1,000,000.

Westinghouse Electric Supply Co., 45 West Twenty-fifth Street, New York, subsidiary of Westinghouse Electric & Mfg. Co., East Pittsburgh, has arranged for purchase of electric supply and equipment division of Stanley & Patterson, Inc., 150 Varick Street, and will operate as unit of organization. Company will be organized under name of Stanley & Patterson Electric Supply Co., to take over and expand business. Stanley & Patterson, Inc., will retain radio and signal manufacturing branches and will develop larger capacity in such lines; George Patterson, president, will continue as head of last noted divisions.

Tenzer Brothers, Inc., 252 West Twen-

INDUSTRIAL CONSTRUCTION

Week's Projects Keep December Average Ahead of That of Both September and October

THE week's contribution to new projects requiring machinery and other industrial equipment was large. It exceeded \$32,500,000 as against \$25,500,000 last week and keeps the average so far in December higher than that for either September or October, as indicated in the accompanying table.

Weekly average for September	\$22,300,000
Weekly average for October	25,900,000
Weekly average for November	87,000,000
Weekly average for December to date..	29,500,000

Not included in these figures are sizable public utility developments covering largely electric power plants. The past week's program in this classification calls for \$60,100,000, against \$95,000,000 for the preceding week.

Specific enterprises of this character, however, were included, and they accounted for \$8,600,000, comparing with \$7,000,000 a week ago.

Various types of industrial plants constituted the largest single group with a total of \$12,800,000, and including a Ford motor assembling plant at Seattle, a plant for the DeVaux motor car at Oakland, Cal., a Kent garage in Philadelphia, an Anheuser-Busch plant on the Pacific Coast, a cement mill near Tulsa and several canning plants near Brownsville, Tex.

Schoolhouses with manual training equipment swell the total by nearly \$5,000,000, the largest ones in Chicago, Cleveland and Port Chester, N. Y.

Other municipal and public works projects call for \$3,800,000, including car repair shops in New York and an airport at Philadelphia and at Oakland, Cal.

Oil refineries and pipe line work are conspicuous, new work amounting to \$2,335,000.

ty-sixth Street, New York, manufacturer of metal partitions, tin products, etc., has leased property at 355 West Thirty-sixth Street, for expansion.

American Can Co., 230 Park Avenue, New York, has awarded general contract to A. W. Quist & Co., Exchange Building, Seattle, for another unit in connection with expansion now in progress at Seattle, to be three-stories, 140 x 540 ft., to cost about \$350,000 with equipment. Part of new structure will be used for storage and distribution.

Theodore H. Wickwire, Jr., 140 East Forty-sixth Street, New York, and Theodore H. Wickwire, 3d, same address, have organized Weldwire Corp., with capital of \$100,000 and 2500 shares of common stock, no par value, and plan operation of local factory for manufacture of wire and metal products.

Service Machine Co., 750 Broadway, Elizabeth, N. J., plans rebuilding part of plant destroyed by fire Dec. 16, with loss over \$25,000 including equipment.

Essex County Board of Vocational Education, Hall of Records, Newark, is arranging a budget for 1931, totaling \$625,300, of which about \$37,100 will be expended for materials and equipment for instruction. Chester R. Hoag is president.

Foster-Wheeler Corp., Carteret, N. J., manufacturer of equipment for oil refineries, power plants, etc., has approved plans for a two-story addition, 60 x 70 ft.

Standard Oil Co. of New Jersey, 26 Broadway, New York, has plans for a bulk oil storage and distributing plant, consisting of three one-story units, at Hackensack, N. J., including automobile service and garage building for company trucks and cars, 112 x 118 ft., to cost over \$80,000 with equipment. Company engineering department is in charge.

Board of Education, 1253 Clinton Avenue, Irvington, N. J., plans installation of manual training equipment in new three-story junior high school, to cost \$400,000. Victor H. Strombach, 1243 Springfield Avenue, is architect.

Various plastic activities of General Electric Co., Schenectady, have been coordinated into one department with R. E. Coleman manager and an advisory committee consisting of Vice-Presidents J. G. Barry, W. R. Burrows and C. E. Eveleth. New department will be responsible for sales, engineering and manufacturing of plastics and involves activities at Pittsfield, Schenectady, Fort Wayne, Erie and Lynn (River) plants.

Maxwell Spiro & Co., formerly at 76 Montgomery Street, Jersey City, N. J., have combined office and works in their new building, 60 x 230 ft., at 241 Communipaw Avenue, Jersey City. Company is engaged in structural steel erecting and fabricating, also ornamental iron work.

Buffalo

BONDS, totaling \$8,000,000, will be issued by Rochester Gas & Electric Co., Rochester, N. Y., part of proceeds to be used for extensions and improvements in plants and system.

George F. Fisk, commissioner of public works, Municipal Building, Buffalo, will receive bids until Dec. 31 for hangar, with repair and reconditioning facilities, and administration building at new Marine Airport, Lakeview Park, as per plans and specifications on file at office of director of buildings, Municipal Build-

ing; also for loading platform, etc., at same place.

Arthur E. Rittenhouse, Honeoye Falls, N. Y., and associates have organized A. E. Rittenhouse Co., Inc., with capital of \$150,000, to operate a local plant for manufacture of machinery and parts. Lloyd W. Rittenhouse, Honeoye Falls, will be an official of new company.

W. H. Stone, Syracuse, N. Y., formerly president of United States Hoffman Machinery Corp., Syracuse, and associates have acquired controlling interest in David Maydole Hammer Co., Norwich, N. Y., manufacturer of hammers and other hardware products, and will reopen plant at early date. Mr. Stone will be president and general manager.

New England

PLANS are under way by Cape & Vineyard Electric Co., Falmouth, Mass., for an addition to steam-operated electric power plant at Vineyard Haven, to cost over \$70,000 with machinery.

American Smokeless Powder Co., Acton, Mass., plans rebuilding main plant unit recently destroyed by fire, with loss estimated at \$50,000 including equipment.

Whitin Machine Works, Whitinsville, Mass., manufacturer of textile machinery and parts, has arranged for purchase of plants and businesses of Fales & Jenks Machine Co., Pawtucket, R. I., manufacturer of textile spinning and twisting machinery, and Woonsocket Machine & Press Co., Inc., Woonsocket, R. I., manufacturer of picking, drawing and kindred machinery. Purchasing company is considering removal of last noted plant to main works at Whitinsville, where production will be expanded. Pawtucket plant, it is understood, will be continued.

New England Power Association, 89 Broad Street, Boston, is arranging for expansion and improvements in power plants and system during 1931 to cost \$12,000,000. Company engineering department will be in charge.

Time Recording Clock Co., Inc., Springfield, Mass., recently formed by Charles E. Cole, 164 Benton Street, Hartford, Conn., and associates with capital of \$50,000, plans operation of local factory for manufacture of special clock mechanisms, etc. Mr. Cole will be treasurer. Walter J. Tidd, Springfield, is president.

Springfield Wire & Tinsel Co., 68 Taylor Street, Springfield, Mass., has awarded a general contract to L. S. Wood Co., 14 Stockbridge Street, for a one-story plant, 85 x 120 ft., to cost about \$45,000 with equipment.

Bids are being taken for a one-story, 43 x 50 ft. and two-story, 15 x 50 ft. shop and office by E. Perrault, 510 South Main Street, Waterbury, Conn., maker of automobile springs.

Gravel and sand bins, conveying equipment, etc., will be purchased by Waterbury Ready Mixed Concrete Co., 94 Benedict Street, Waterbury, Conn. Construction will start soon on new plant.

Granville Brothers' Aircraft Corp., Springfield, Mass., is contemplating erection of a manufacturing plant. Z. H. Granville, 1211 Liberty Street, is president.

City of Holyoke, Mass., has closed bids on a vocational school for which shop equipment will be purchased.

McKesson & Robbins, Fairfield, Conn., manufacturer of chemicals, has closed bids on a four-story addition and alterations, to cost \$150,000 with equipment.

Specialty Automatic Machine Co., has removed its factory and office from Waltham, Mass., to 200 Boston Avenue, Medford, Mass.

South Atlantic

PLANS are under way by Palais Royal, Inc., Eleventh and G Streets, N.W., Washington, for four-story storage and distributing building for furniture and other products, 150 x 190 ft., to include repair shop for motor trucks, furniture finishing shop, conveying system for loading, bin units, etc., to cost over \$150,000. Frederic G. Pyle, Evans Building, is architect. Abbott, Merkt & Co., 175 Fifth Avenue, New York, are engineers.

Enterprise Wire & Iron Works, 423 North High Street, Baltimore, will build one-story plant, 55 x 80 ft., on North Colvin Street, to cost close to \$30,000 including equipment.

Virginia Public Service Co., Charlottesville, Va., is disposing of a bond issue of \$6,000,000, part of proceeds to be used for extensions and improvements in plants and system, including transmission lines.

Franklin Motor & Service Garage, Ninth and Franklin Streets, Richmond, Va., has plans for multi-story automobile service, repair and garage building, 100 x 145 ft., to cost over \$300,000 with equipment. Marcellus E. Wright, American National Bank Building, is architect.

Board of District Commissioners, District Building, Washington, has authorized purchase of site at Eighteenth Street and Minnesota Avenue, S.E., for new multi-story junior high school to cost over \$500,000, and plans installation of manual training equipment. Plans will be drawn by A. L. Harris, District Building, municipal architect.

American Cooperage Co., 141 North Kresson Street, Baltimore, is considering one-story addition for production of steel drums, to cost about \$35,000 with equipment.

Washington Gas Light Co., Washington, is negotiating for purchase of artificial gas-manufacturing plant operated by City Council, Fredericksburg, Md., and will operate as branch plant for that place and vicinity.

S. D. Stout, Denton, N. C., and associates are considering ice-manufacturing plant at Asheboro, N. C., to cost about \$40,000 with machinery.

Chemical Warfare Service, Edgewood Arsenal, Md., will receive bids until Jan. 6, for 4400 tinplate unit containers.

Coca-Cola Bottling Co., Atlanta, Ga., has awarded general contract to Gilbert Beers Co., Bona Allen Building, for two-story bottling plant at Swainsboro, Ga., to include automatic bottling machinery, mechanical conveying and handling equipment, etc., to cost over \$40,000. Pringle & Smith, Norris Building, Atlanta, are architects. Company branch at 1010 Gurnee Street, Anniston, Ala., will operate plant.

Cecil County School Board, Elkton, Md., is considering installation of manual training equipment in new two-story high school at Rising Sun, to cost over \$150,000, for which bids will soon be asked on general contract. Clyde N. and Nelson Friz, Lexington Building, Baltimore, are architects.

Bureau of Yards and Docks, Navy Department, Washington, has authorized a call for bids for a 3-ton electric bridge crane, 1-ton hand-operated bridge crane and 1½-ton trolley chain hoist, for service at Coco Solo, Canal Zone.

Pittsburgh

GENERAL contract has been awarded by Davison Coke & Iron Co., Oliver Building, Pittsburgh, to Rust Engineering Co., Koppers Building, for a cement storage and distributing plant at Neville Island plant, including pumping station, etc., to cost over \$70,000 with equipment.

William Leard Co., New Brighton, Pa., manufacturer of steel forgings, etc., has awarded general contract to Pittsburgh Bridge & Iron Co., Fulton Building, Pittsburgh, for one-story addition, 40 x 110 ft., to cost close to \$40,000 with equipment.

Monaca Glass Co., Knox, Pa., recently organized by Finley B. Hess, Knox, and associates, with capital of \$50,000, plans operation of local factory for production of glass containers and kindred products. Mr. Hess will be treasurer. C. R. Underwood, Knox, and G. A. Mengle, Brockway, Pa., are interested in new organization.

Sun Oil Co., 1608 Walnut Street, Philadelphia, has awarded general contract for oil storage and distributing plant at Greensburg, Pa., to Hughes-Foulkrod Co., Stevenson-Foster Building, Pittsburgh, including main unit, power house, pumping plant and other structures, to cost over \$60,000 with equipment.

Treadwell Construction Co., Midland, Pa., manufacturer of steel plate products, tanks, etc., is completing erection of a new one-story unit for expansion in steel-lined products division, to cost over \$200,000 with equipment.

Koppers Co., Koppers Building, Pittsburgh, is considering erection of automobile service, repair and garage building for company trucks and cars, to cost over \$100,000 with equipment.

Chicago

BOARD of Education, 460 South State Street, Chicago, plans installation of manual training equipment in proposed new high school in Skokl district, to cost over \$1,000,000. W. R. McCornack, 1006 Carnegie Avenue, is architect.

Blandin Paper Co., Grand Rapids, Minn., has plans for one-story addition, 48 x 300 ft., to cost over \$125,000 with equipment.

Mid-Continent Petroleum Corp., 320 North Fourth Street, St. Louis, has plans for a bulk oil storage and distributing plant at Quincy, Ill., to cost about \$50,000 with equipment.

Board of Public Works, Minneapolis, has approved plans for coal terminal, storage and distributing plant at foot of Washington Avenue bridge, with conveying, loading and other mechanical-handling equipment, to cost about \$200,000. N. W. Elsberg, City Hall, is city engineer.

Officials of Crescent Lime & Marble Co., Pearl City, Ill., are organizing company to erect and operate a lime and dry ice manufacturing plant near city limits of Springfield, Ill., to cost close to \$100,000 with machinery.

Colorado Interstate Gas Co., Colorado Springs, Colo., F. J. Trelease, president, has awarded general contract to Southwestern Construction Co., Tulsa, Okla., for construction of pipe line from Devine to Portland, Colo., to cost about \$500,000 with booster stations and accessory equipment. Ford, Bacon & Davis, Colorado Springs National Bank Building, Colorado Springs, is consulting engineer.

Victor Mfg. & Gasket Co., 5750 West Roosevelt Road, Chicago, manufacturer of gaskets and other power plant equipment, has arranged for increase in capital from \$2,500,000 to \$5,000,000 for expansion.

United Electric Coal Companies, Inc., Danville, Ill., plan installation of new unit at coal-mining plant at Duquoin, Ill., to cost about \$125,000 with equipment.

Rocky Mountain Power Co., Helena, Mont., will proceed with construction of hydroelectric generating plant on Flathead River, near Polson, Mont., including large power dam. Entire project, with steel tower transmission lines, will cost over \$8,000,000. Frank N. Kerr is general manager.

With sufficient orders for Monarch tractors to keep its plant at Springfield, Ill., operating at capacity for six months, Allis-Chalmers Mfg. Co., Milwaukee, has announced that between 165 and 175 men will be added to payroll within next fortnight. Monarch tractors are manufactured exclusively at Springfield.

About 60 men will be added at once to force of union malleable plant of Deere & Co., East Moline, Ill., putting operations at 60 per cent of capacity. If present orders continue plant will operate on regular five-day basis until business further improves.

Gulf States

PLANS are under way by National Air Transport, Inc., 420 Lexington Avenue, New York, for a new hangar with repair and reconditioning facilities for large passenger planes at Love Field, Dallas, Tex., to cost about \$75,000 with equipment. Company engineering department is in charge.

West Texas Utilities Co., Abilene, Tex., is disposing of a bond issue of \$3,750,000, part of fund to be used for extensions and improvements in electric light and power plants and systems. Company engineering department will be in charge.

Pure Ice & Cold Storage Co., Lake Charles, La., has approved plans for a new ice-manufacturing and cold storage plant, and is considering early call for bids for ice-making equipment, electrical apparatus, oil engine and accessories. E. K. Strahan, Inc., 816 Howard Avenue, is engineer.

Walker-Craig Corp., Brownsville, Tex., operating Olmito Canning Co., is planning erection of five or six canning plants in valley district near Brownsville, to cost over \$600,000 with machinery.

Mercedes Independent School District, Mercedes, Tex., plans installation of manual training equipment in new high school to cost about \$125,000, for which bids will be asked soon on general contract. R. Newell Waters, Weslaco, Tex., is architect; W. E. Simpson, Milam Building, San Antonio, Tex., is engineer.

Firestone Tire & Rubber Co., Akron, Ohio, is considering two-story factory branch, storage and distributing plant at San Angelo, Tex., to cost close to \$100,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, contemplates expansion and improvements at naval air station at Pensacola, Fla., to cost about \$400,000 with equipment.

Officials of Lone Star Gas Co., Dallas, Tex., oil and gasoline products, are organizing a subsidiary under name of Lone Star Gasoline Co., to take over certain properties of Chestnut & Smith

Corp., Tulsa, Okla., near Westwego, La., including plants of its subsidiary, Naturaline Co. of America, Inc. Property includes gasoline refineries, pipe lines, storage and distributing plants, leaseholds, etc. New owner plans expansion and improvements.

Cuero Coca-Cola Bottling Co., Cuero, Tex., has plans for a new two-story plant, 44 x 50 ft., with installation of automatic bottling machinery, conveying equipment, etc., to cost about \$35,000. Otto Buckhorn, Cuero, is architect. E. T. Summers is manager.

United Pipe Line Corp., a subsidiary of United Gas Co., Fort Worth, Tex., has approved plans for construction of a pipe line at Kirbyville, Tex., and vicinity, including branches to points in southwestern part of Louisiana, about 150 miles, to cost over \$1,000,000 with compressor stations and other operating equipment.

Milwaukee

CONTRACTS have been placed by Municipal Foundries, Inc., 663 Seventy-fifth Avenue, West Allis, Milwaukee, for a shop addition, 70 x 150 ft., costing about \$25,000 with equipment. Concern specializes in municipal castings. Leroy G. Zimmermann is president.

Kimberly-Clark Corp., 128 North Commercial Street, Neenah, Wis., is taking bids until Dec. 29 for new acid plant, 58 x 121 ft., one story and part basement, designed by its staff engineers. Cost is estimated at more than \$50,000, including equipment.

Board of Education, New London, Wis., will open bids Jan. 29 for new \$225,000 high school with manual training facilities, designed by Smith & Brandt, architects, Appleton and Mankowoc, Wis. R. J. McMahon is secretary of school board.

Water Works Commission, Neenah, Wis., has plans for new steel water storage tank and tower, capacity 500,000 to 600,000 gal., at city pumping plant. Bids will be asked shortly. H. S. Zemlock is city clerk.

Cleveland

PLANS are under way by France Stone Co., Second National Bank Building, Toledo, Ohio, for extensions and improvements in plant at Bascom, Ohio, including new three-story building, installation of quarrying machinery, conveying and other equipment. A new office building will be erected. Entire project will cost over \$75,000.

Eaton Bumper & Spring Service Co., Cleveland, has been formed to take over and expand company of same name with plant at East Sixty-fifth Street and Central Avenue. William H. Chamberlain and J. C. Little are among incorporators. Company is affiliated with Eaton Axle & Spring Co., same address.

Tremco Mfg. Co., 293 East 131st Street, Cleveland, manufacturer of caulking and glazing materials, waterproofing compounds, etc., will operate a branch plant at Toronto, Ont., and has organized Tremco Mfg. Co., Ltd., Canada, to establish new works.

Board of Education, Standard Trust Building, Cleveland, has authorized installation of manual training equipment in new three-story James Ford Rhodes high school to cost over \$750,000, for

which bids have been asked on general contract. George Hopkinson, Auditorium Garage Building, is architect for board.

Officials of Thompson Aeronautical Corp., Union Trust Building, Cleveland, manufacturer of aircraft equipment and accessories, have organized Transamerican Airlines Corp., to take over and expand all air transport operations of parent company. Company will develop air transportation system in Great Lakes district, including airports and hangar facilities, repair shops, etc. Edwin G. Thompson is head of both organizations.

Direct Action Stove Division of National Stove Works, Lorain, Ohio, a subsidiary of American Stove Co., 825 Chouteau Avenue, St. Louis, has engaged Carter-Richards Co., Engineers Building, Cleveland, engineer, to prepare plans for two additions, for punch press shop and enameling works, respectively, each to cost about \$200,000 with equipment. Last noted will be one-story, 125 x 125 ft. J. R. Haley is plant superintendent.

Philadelphia

CONTRACT has been let by Kent Philadelphia Garage, Philadelphia, affiliated with Kent Automatic Parking Garage, Inc., 209 East Forty-third Street, New York, to Murphy, Quigley & Co., 1518 Sansom Street, Philadelphia, for twenty-six story automobile service, repair and garage building on Fifteenth Street, 50 x 150 ft., to cost over \$2,000,000 with equipment. S. Arthur Love, Jr., Juniper and Walnut Streets, is architect.

Ridgway Auto Body Works, Philadelphia, has leased factory at 1720-24 Fairmount Avenue, for manufacture of commercial automobile bodies, etc.

Department of Public Works, City Hall Annex, Philadelphia, has purchased buildings and other equipment of United States Shipping Board at Hog Island for \$50,000, and will use part of property for establishment of municipal airport, for which plans are under way. Project will include hangars, repair shops, administration and other units to cost over \$1,000,000 with equipment.

Atlantic City Electric Co., Atlantic City, N. J., plans construction of transmission line from Brigantine Beach to Beach Haven and vicinity, to cost about \$150,000. Clifton H. Howell is general manager.

Pneumatic Equipment Co., Philadelphia, Pa., recently organized by S. Elverson Smith, 23 South High Street, West Chester, Pa., and associates with capital of \$25,000, contemplates operation of local plant for production of pneumatic equipment and tools. Mr. Smith will be treasurer; Henry N. Schramm, 412 West Miner Street, West Chester, will be an official.

Board of Education, Millersburg, Pa., is planning installation of manual training equipment in new high school on 8-acre tract on Center Street, to cost over \$175,000. Jamison & Minnick, Harrisburg, Pa., are architects.

Chevrolet Commercial Body Division of Chevrolet Motor Co., 3044 West Grand Boulevard, Detroit, has leased 13,000 sq. ft. floor area in one-story building at Twenty-fifth and Westmoreland Streets, Philadelphia, for new branch plant for commercial body production.

Pennsylvania Power & Light Co., Allentown, Pa., will take over a number of electric light and power properties, including Hartleton Power & Light Co., Hartleton; Lancaster Electric Light, Heat & Power Co., Lancaster; Wrights-

ville Light & Power Co., Wrightsville; and New Kingston Electric Light, Heat & Power Co., New Kingston, and will consolidate. Expansion is planned in different districts, including transmission lines.

Carlisle Tire & Rubber Co., Carlisle, Pa., manufacturer of automobile tires and rubber goods, has arranged for increase in capital from \$250,000 to \$2,000,000, part of proceeds to be used for expansion in output.

A. L. Otto & Tull Co., Inc., Philadelphia, recently organized, will take over and consolidate A. L. Otto Co., 732 North Harmony Street, manufacturer of weatherstrips and other metal specialties, porch enclosures, etc., and other local interests. Company plans expansion in output. M. Graham Tull, 202 West Beechtree Street, Wayne, Pa., is treasurer, and Arthur L. Otto, president.

Plant and property of Hobson Flatware Co., Lambertville, N. J., manufacturer of plated goods, etc., will be offered at a public sale Dec. 29, at Court House, Flemington, N. J., by William A. Walsh and William E. Meghinnes, receivers. Plant was established and placed in operation only a short time ago.

Detroit

BIDS will be asked early in January by Holt Mica Spark Plug Co., Holt, Mich., recently organized by Clayton E. Hunt, Holt, and associates, for one-story plant to cost about \$40,000 with machinery. Company is capitalized at \$60,000 and 100,000 shares of stock, no par value. Herman D. Jessup, Holt, will be an official of new organization.

Pere Marquette Railway Co., Fort Street Union Depot, Detroit, has awarded a general contract to Oscar Nelson, Ludington, Mich., for a one-story repair shop for marine equipment at Ludington, to cost about \$40,000 with machinery.

A. A. Clarke, Muskegon, Mich., and associates have organized A. A. Clarke Co., with capital of \$250,000, and plan operation of local factory for production of vacuum cleaners and kindred electrical appliances. Thomas B. Bennett will be an official of new company.

Negotiations are being concluded for a consolidation of Round Oak Furnace Co., Dowagiac, Mich., manufacturer of stoves, furnaces, etc., and Beckwith Co., manufacturer of stoves, gas ranges, parts, etc., with plant in same city. New company will be formed to take over both organizations, headed by Fred B. Lee, heretofore head of Beckwith company, and W. J. Fickinger, another official.

Ford Motor Co., Dearborn, Mich., will take bids at once for new assembling plant on 30-acre tract on East Marginal Way, Seattle, recently acquired, consisting of main assembling unit, machine shops, power house, pumping plant and other structures, including a concrete dock, 40 ft. wide and 500 ft. long, equipped with cranes and other mechanical-handling equipment. Craneway will be constructed through main unit. Plant will have capacity of 300 cars and motor trucks a day, and will replace present assembling works which have a rating of 115 cars daily. It is expected to begin superstructure in January. Entire project will cost \$2,500,000 with machinery. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer.

General Motors Corp., Detroit, has awarded general contract to Austin Co.,

for one-story addition to malleable iron works at Saginaw, Mich., including improvements in present unit, to cost over \$70,000 with equipment.

Chevrolet Motor Co., 3044 West Grand Boulevard, Detroit, has plans for new motor truck body assembling plant at Jacksonville, Fla., one-story, to cost over \$75,000 with equipment.

Cincinnati

BIDS have been asked on general contract by Gulf Refining Co., Frick Annex, Pittsburgh, for a new oil refinery at Cleves, including purification acid concentrator unit, alkali works, compressor building and power house, to cost over \$600,000 with machinery. Edward B. Lee, Chamber of Commerce Building, Pittsburgh, is architect.

Joseph G. Stelinkamp & Brother, Mercantile Library Building, Cincinnati, architects, have plans for a one and four-story motor truck service, repair and sales building, to cost over \$150,000 with equipment. Fosdick & Hilmer, Union Trust Building, are consulting engineers.

Tennessee Electric Power Co., Chattanooga, Tenn., is planning an expansion and improvement program during 1931 to cost about \$4,500,000, of which approximately \$3,750,000 will be expended for electric light and power department. Of this amount, about \$750,000 will be used in Chattanooga district for extensions in power plants, transmission lines and other work. Company engineering department will be in charge.

Contracting Officer, Wright Field, Dayton, Ohio, will receive bids until Jan. 5 for 133 electric drills, counterbores, countersinks and drills, gages, hammers, knives, pliers, punches, saws, spikes, etc., milling and keyseat cutters, 50 tinnern's furnaces and 155 gasoline fire pots, and 57 callipers; until Jan. 2 for bomb release handle assemblies and 50 supercharger regulator assemblies.

Standard Oil Co., Ashland, Ky., has awarded general contract to Adams & Fosson, Ashland, for a bulk oil storage and distributing plant, to cost over \$45,000 with equipment.

Peter F. O'Neill, 1800 Ringgold Road, Chattanooga, Tenn., and associates have organized New Era Electric Devices, Inc., and will operate local plant for manufacture of patented electric controls for textile machinery and parts.

St. Louis

BIDS will soon be asked on general contract by Board of Public Utilities, Kansas City, Kan., for a one and two-story addition to municipal power plant, 95 x 125 ft., to cost over \$100,000 with equipment. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is engineer.

Century Electric Co., 1806 Pine Street, St. Louis, has awarded contract to Superior Structural Steel Co., 3727 Market Street, for one-story foundry addition, 40 x 286 ft., with extension 43 x 94 ft., to cost over \$60,000 with equipment. Cranes and other material-handling equipment will be installed. Edward J. Lawler, 3727 Market Street, is architect.

In connection with new yeast manufacturing plant near Old Bridge, N. J., for which plans are under way, Anheuser-Busch, Inc., 721 Pestlozzi Street, St. Louis, is planning erection of a similar

plant on Pacific Coast, project to include machine shop, boiler plant and other units, to cost close to \$1,000,000 with machinery. Old Bridge plant will be operated under direction of Adolphus Busch 3d.

St. Joseph Railway, Light, Heat & Power Co., St. Joseph, Mo., will soon take bids on revised plans for a two-story and basement addition, 60 x 120 ft., to equipment storage, service and distributing plant, including improvements in garage and service unit, to cost close to \$60,000. Walter Boschen, Tootle-Lacy Building, is architect.

Acme Furnace & Sheet Metal Co., 407 Southwest Boulevard, Kansas City, Mo., has awarded general contract to D. M. Wall, 2617 Agnes Street, for a one-story addition, 50 x 100 ft., to cost about \$25,000 with equipment. H. D. Pampel, Finance Building, is architect.

Missouri Portland Cement Co., Telephone Building, St. Louis, is considering plans for new cement mill near Tulsa, Okla., to cost over \$500,000 with equipment. Company engineering department is in charge.

McArthur Packing Co., East Fourth Street, Hutchinson, Kan., meat packer, has awarded general contract to Stamey Construction Co., 101 East Eighth Street, for two one-story additions, 20 x 90 ft., and 15 x 60 ft., including improvements in present plant, to cost about \$60,000 with equipment. W. E. Hulse & Co., Stamey Hotel Building, are architects.

Coca-Cola Bottling Co., Second and State Streets, Pine Bluff, Ark., has awarded general contract to E. C. Royce Building Co., 115 Pine Street, for one-story addition, 60 x 120 ft., to cost about \$40,000 with equipment. Mitchell Seligman, National Building, is architect.

Midwest Forge & Steel Co., Twenty-first Street and Summit Avenue, East St. Louis, Ill., recently organized with capital of \$65,000, plans operation of local forge shop. New company is headed by John W. and Emilie A. Echenbrenner, both of East St. Louis.

Indiana

PLANT of Wood Turret Lathe Co., Brazil, has been acquired by R. L. Sodaker, Brazil, and associates. New owners will remodel plant for a new pottery, and have secured about 11 acres of clay land in vicinity for raw material supply. Clay-mining, conveying and other equipment will be installed. A new company will be formed.

W. J. Holliday & Co., 545 West McCarty Street, Indianapolis, iron and steel products, have awarded a general contract to Austin Co., Chicago, for one-story storage and distributing plant at Hammond, Ind., 220 x 225 ft., to cost over \$100,000 with equipment.

City Council, Warsaw, has instructed Harry Watkins, city clerk, to secure estimates of cost for a municipal electric light and power plant.

Starr Piano Co., Richmond, has purchased controlling interest in Benedict & Co., Inc., 2867 West Pico Boulevard, Los Angeles, manufacturer of refrigerating machinery and parts, and will operate as an affiliated organization under present name. New owner is selecting site in another part of Los Angeles for erection of new plant for Benedict manufacture, to cost close to \$200,000 with equipment.

Merrill J. Woods, 345 Campbell Avenue, Indianapolis, and associates have organized Utility Hoist & Body Co., Inc., and plan operation of local works for manufacture of commercial automobile bodies, truck hoists, etc. S. A. Mason, Indianapolis, is interested in new company.

Pacific Coast

OFFICIALS of Pioneer Sand & Gravel Co., 901 Harrison Street, Seattle, have plans for one-story steel fabricating plant, 75 x 165 ft., to cost about \$40,000 with equipment. H. D. Prosser, Seattle, is architect.

Bliss & Fairweather, Balboa Building, San Francisco, architects, have plans for two-story automobile service, repair and garage building, to cost about \$300,000 with equipment.

Deveaux-Hall Motors Corp., Oakland, Cal., recently organized by Norman Deveaux, Oakland, heretofore associated with Durant Motor Co. of California, Inc., with local plant, has purchased factory noted and will convert for manufacture of a new six-cylinder automobile to be known as "Deveaux-Six." Local plant will be remodeled and will be used primarily as an assembling unit. Company has also acquired a plant at Grand Rapids, Mich., for eastern assembling operations. Entire project will cost over \$2,000,000. Mr. Deveaux will be president of new organization, in which Col. Elbert J. Hall will also be an official.

Electrical District No. 3, Maricopa, Ariz., is arranging bond issue of \$290,600, proceeds to be used for construction of a steel tower transmission line in Casa Grande district, on which work will soon begin. Power supply will be secured from the Arizona Edison Co., Phoenix, which will carry out expansion for that purpose. Forrest T. Rainey, Casa Grande, is secretary of district.

D. W. Hoferer, Long Beach, Cal., and associates have organized Hofco Pump, Inc., with capital of \$100,000, and plan early operation of local factory for manufacture of pumping machinery and parts. New company will be represented by Carl E. Cameron, Farmers & Merchants Bank Building, Long Beach.

East Bay Municipal Utility District, Oakland, Cal., is planning hydro-electric power development on Mokelumne River, near Mokelumne Hill and Jackson, Amador County, to cost over \$1,000,000 with transmission lines.

W. H. Webb, Santa Paula, Cal., has plans for new rock crushing plant near Lompoc, Cal., including conveying, loading and other mechanical-handling equipment in addition to stone-crushing machinery, etc., to cost over \$35,000.

Southern California Edison Co., Los Angeles, will dispose of a bond issue of \$5,000,000, part of proceeds to be used for extensions and improvements in power plants and system.

Kalite Co., Pasadena, Cal., has approved plans for a new crusher and reduction plant at pumice mining properties on Pumice Island, near Calipatria, Cal., to cost about \$35,000 with equipment.

Canada

ANUMBER of contracts have been let in connection with a two-story plant at Cornwall, Ont., for Cortaulds (Canada), Ltd., to cost \$250,000.

Hyatt Jumbo Roofing Co., Ltd., 10 Aylmer Street, Windsor, Ont., is considering erection of a plant at London, Ont., to cost \$100,000.

Dominion Rubber Co., Ltd., 1665 Notre Dame Street, East, Montreal, has plans for an addition and will soon call for bids.

Hayward Lumber Co., Vegreville, Alberta, will rebuild its lumber mill recently destroyed by fire and is interested in equipment.

Bristol, Myers Co., 1239 Benoit Street, Montreal, has let contract for a two-story factory addition.

Foreign

PLANS are under way by SKF Ball Bearing Co., Gothenburg, Sweden, for new plant at Moscow, Russia, to triple capacity of present factory at that place, to cost over \$500,000 with equipment.

A company at Latvia, Lithuania, is planning erection of a beet sugar mill in Vilkaviskis district, to include machine shop, power house and other units. Information at office of Bureau of Foreign and Domestic Commerce, Washington, reference Lithuania, No. 118767.

Miller Textile Mill, Nuevo Laredo, Mexico, is planning to rebuild part of plant recently destroyed by fire with loss close to \$100,000 including equipment. Bryan D. Miller is manager.

Energie Electrique du Rhin, Paris, France, operating electric light and power properties, has arranged for a bond issue of 250,000,000 fr. (about \$10,000,000), fund to be used in connection with construction of Grand Canal of Alsace, paralleling Rhine River, with diversion of water for a hydroelectric generating plant at Kembs with capacity of 200,000 hp. Project will include steel tower transmission line. Initial units are scheduled to be ready for service in fall of 1932.

Enka Co., Prague-Karlín, Czechoslovakia, manufacturer of popular-priced automobiles, etc., is planning expansion for manufacture of sound-film producing equipment, recently perfected and patented, and will install additional equipment for such output.

New Trade Publications

Motors and Motor Parts.—General Electric Co., Schenectady, N. Y. A large variety of motors—fractional-horsepower, direct-current crane and hoist, super-synchronous for large grinding and pulverizing mills, general-purpose squirrel-cage induction, motor-generator sets, capacitor-motors, synchronous motors for driving metal-rolling mills, etc.—are illustrated and described in separate pieces of publicity.

Electric Cable-Reel Equipment.—General Electric Co., Schenectady, N. Y. Circular GEA-1297, illustrating and describing several types of cable-reel equipment for installation on mine locomotives.

Centrifugal Air Compressors.—General Electric Co., Schenectady, N. Y. Folder GEA-904D of four pages describes single-stage centrifugal air compressors for cupola blowing, said to supply automatically a constant weight of air to the cupola, irrespective of atmospheric conditions and the resistance through the cupola.

Public Works Projects to Cost \$700,000,000

WASHINGTON, Dec. 23.—President Hoover is expected to issue a statement soon giving an itemized statement of the public works projects that will be undertaken in 1931, which the administration has said would involve an expenditure of \$700,000,000. The large program is intended partially to relieve the unemployment situation. The outlay will be almost treble that of 1928, the latest year of steady prosperity. Part of the \$700,000,000 is carried in the emergency construction bill of \$116,000,000 passed by Congress before its adjournment during the holiday period.

Steel Corporation's Unfilled Orders Increase

For the second consecutive month, there has been an increase in the unfilled orders of the United States Steel Corp. It is also the second increase since July. The total unfilled orders on Nov. 30 was 3,639,636 tons, an increase of 157,873 tons over the 3,481,763 tons as of Oct. 31.

Unfilled tonnage at the end of each month for the past two years and ten months follows:

	1929	1928
January	4,468,710	4,109,487
February	4,479,748	4,144,341
March	4,570,653	4,410,718
April	4,354,220	4,427,763
May	4,059,227	4,304,167
June	3,968,064	4,256,910
July	4,022,055	4,088,177
August	3,580,204	3,658,211
September	3,424,338	3,902,581
October	3,481,763	4,086,562
November	3,639,636	4,125,345
December	.....	4,417,193

Manganese Producers File Answer on "Dumping"

WASHINGTON, Dec. 22.—The American Manganese Producers' Association has filed an answer to the recent brief of the American Iron and Steel Institute, which denied allegations of "dumping" of Russian manganese ore in this country.

In their answer, the American manganese companies state that the cost of production of Russian ore is \$23.97 a ton and that it is being sold in the United States at about \$12.50 a ton, and they contend that this price, being below the "fair value," is prima facie evidence of dumping.

Further, the brief says:

"Despite the fact that many millions of dollars have been invested in the American manganese industry, and despite the fact that during the war the American manganese industry helped to save American participation in the war from being futile, the institute, in its brief, has the blatant effrontery to assert that there is no manganese industry in the United States. They base this strange assertion on their contention that in 1929 only 6.95 per cent of the American consumption of manganese ore was furnished by domestic producers.

"If great potential production was small, it was due to the fact that the American steel industry refused to purchase from domestic producers. Naturally, it would be foolhardy to increasingly produce a product which could not be sold. We assert again that the steel companies bought abroad the identical manganese at higher prices than that which they might have bought from American producers at lower prices."

River Shipments of Steel Down in November

Shipments of iron and steel products on the Ohio River in the Pittsburgh district during November amounted to 95,644 net tons, according to the United States Engineer office, Pittsburgh. This compared with 88,011 tons in November, 1929, and with 138,109 tons in October, 1930. Monongahela River shipments totaled 75,202 tons in November, against 105,451 tons in the preceding month and with 83,189 tons in November, 1929. On the Allegheny River 17,850 tons of iron and steel were moved in November, compared with 11,490 tons in October and 500 tons in November of last year.

Commodity Prices Drop Further in November

Prices of wholesale commodities reported upon by the United States Bureau of Labor Statistics showed a further drop of about 2.5 per cent in November to an index of 80.4, against 82.6 in October. With the exception of a fractional rise in September the decline has not been broken since July, 1929, when the index stood at 98. The present figure is much the lowest since the new index was developed by the bureau, based on 1926 prices at 100.

Every one of the 10 groups making up the total of 550 commodities showed a drop, and several of them a sharp drop, in November. Metals and metal products, at 90.2, was almost the same as the 90.4 in October. This change was made up of fractional declines in the iron and steel component, that for automobiles and "other metal products." Non-ferrous metals went up from 67.8 to 68.4, while agricultural implements, at 94.9, showed no change.

Of the other main groups, building materials showed only a fractional decline, the element of structural steel within this group remaining stationary, at 81.7.

Dividing the list into raw materials, semi-manufactured articles and finished products, the first and last declined, while the semi-manufactured articles showed a fractional advance. Raw materials dropped from 80 to 76.8 during the month, and finished products, from 85.6 in October to 83.7 in November. Non-agricultural commodities as a group were 80.9 in November, against 82.8 in October.

Weirton to Start New Mill on Dec. 29

The Weirton Steel division of the National Steel Corp. will start operation of its new combination rail and structural steel mill at Weirton, on Dec. 29. The mill has a capacity of 20,000 tons a month, increasing the company's finishing capacity at the Weirton plant to a total of 1,300,000 tons a year.

Construction of the new mill was started in May of this year. The cost was approximately \$3,000,000. In addition to producing standard structural shapes, it will produce rails, tie plates, splice bars, square and round sections.

Standards Association Elects Officers

Bancroft Gherardi, vice-president and chief engineer American Telephone & Telegraph Co., was elected president of the American Standards Association, at the recent annual meeting of the association in New York.

Cloyd M. Chapman, consulting engineer, New York, was named vice-president for the year 1931. The board of directors, for next year include: Quincy Bent, vice-president, Bethlehem Steel Co.; George K. Burgess, director, United States Bureau of Standards; C. L. Collens, president, Reliance Electric & Engineering Co.; Howard Coonley, president, Walworth Co.; L. A. Downs, president, Illinois Central Railroad; F. E. Moskovics, president, Improved Products Corp.; W. J. Serrill, United Gas Improvement Company; C. E. Skinner, assistant director of engineering, Westinghouse Electric & Mfg. Co.; M. S. Sloan, president, New York Edison Co., and R. J. Sullivan, vice-president, Travelers Insurance Co.

Track Bolt and Nut Standards Approved

The American standard on track bolts and nuts, prepared by the technical committee on bolt, nut, and rivet proportions, has been approved by the American Standards Association. The standard is based on a study of the different types of track bolts used by the various railroads and electric railways in the United States and Canada and it is thought that the recommended dimensions will cause little disturbance to existing practice. Particular attention has been given to the reduction of the number of wrench openings needed.

Tests carried out by the railroads and manufacturers of track bolts on samples made to the dimensions of the standard appear to give satisfactory results, and the American Railway Engineering Association adopted the standard in May, 1930, as its recommended practice.

World-Wide Depression Brings Search for Antidotes in Europe

(By Cablegram)

LONDON, Dec. 22.

THAT the tin plate industry is suffering in common with all industry in the general world trade depression was argued by Henry Bond, chairman of Richard Thomas & Co., Ltd., in addressing the annual shareholders' meeting. The heavy fall in commodity prices has restricted the purchasing power of many of the industry's customers in different parts of the world, and has induced a lack of confidence in the stability of prices.

This, in turn, checks demand.

Meantime, the fall in prices of commodities has reduced the cost of production of tin plate. But, under existing conditions, lower prices for that product did not increase the demand. The Welsh tin plate industry has gained much during the past year or two by domestic and international arrangements and cooperation.

Tin plate markets are quiet, under holiday influences, but prices are being maintained on restricted output and the firmer tendency in the tin market. Many mills are closed already, to adjust production in accordance with their authorized quotas, while others are preparing to close for varying periods.

Opel Motor Works, German subsidiary of General Motors Co., to build 150,000 cars in 1931.

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Czechoslovakia reduces duties on steel imports and domestic market declines.

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German steel industry reported to be heavily over-expanded.

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Polish steel and machinery industries have 14 per cent of American capital and 11 per cent German.

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Tata Iron & Steel Co. to build two 1600-ton blast furnaces, replacing three old units.

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Japan inquires for special long-life tramway rails 46 ft. long.

Approaching holidays are influencing all the markets, and business is virtually stagnant. A number of works are closing until early January. The feeling is growing that Cleveland pig iron prices must be re-

duced, as Continental and Indian pig iron is coming in at cheaper rates. Cleveland stocks are increasing, as consumers are suspending receipt of deliveries over the holidays. Four more Scottish blast furnaces have been banked, leaving only six active.

Indian pig iron is being offered at 60s. (\$14.60) delivered at Scottish works, equivalent to about 35s. (\$8.50) at Indian furnaces. Deadweight cargo space for Indian pig iron has been booked by one shipping company for 1931 shipments to Glasgow, Middlesbrough and Newport.

Finished steel is dull and the outlook is gloomy. The Admiralty's naval program will provide work, but two months or more must elapse before orders are placed for the necessary steel. Export demand is poor, and several works are closing for a long holiday period.

Galvanized and black sheet markets are idle.

Continental iron and steel prices are firm, on account of Belgo-Luxemburg mills having booked orders for 60,000 to 70,000 tons of rails for the Belgian railroads and for export, and there is anticipation of further releases of 27,000 tons early in January.

British and Continental European Export Prices per gross ton, f. o. b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.8665 (par)

British Prices f. o. b. United Kingdom Ports

Ferromanganese, export.	£11 5s. to £11 10s.	\$54.75 to \$55.95
Billets, open-hearth.	5 12½ to 6 5	27.34 to 30.41
Black sheets, Japanese specifications	12 5 to 15 ½	59.61 to 3.77 to 3.89
Tin plate, per base box	0 15½ to 0 16	Cents a Lb.
Steel bars, open-hearth.	7 15 to 8 5	1.69 to 1.79
Beams, open-hearth.	7 7½ to 7 17½	1.60 to 1.71
Channels, open-hearth.	7 12½ to 8 12½	1.66 to 1.87
Angles, open-hearth.	7 7½ to 7 17½	1.60 to 1.71
Black sheets, No. 24 gage	9 0 to 9 5	1.95 to 2.01
Galvanized sheets, No. 24 gage	11 5	2.44

Continental Prices, f. o. b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2 9s. to £2 10s.	\$11.92 to \$12.16
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Billets, Thomas (nominal)	£3 14½s. to £3 15s.	\$18.12 to \$18.24
Wire rods, low C., No. 5	5 2½ to 5 7½	24.94 to 26.15
B.W.G.	6 0	29.20
Rails, light	11 5 to 12 12	54.68 to 58.22
Black sheets, No. 31 gage, Japanese	4 7½ to 4 10	Cents a Lb. 0.93 to 0.97
Steel bars, merchant.	3 19 to 4 0	0.86 to 0.87
Beams, Thomas, British standard (nominal)	5 12 to 5 14	1.24 to 1.26
Channels, Thomas, American sections	4 2 to 4 3	0.88 to 0.89
Angles, Thomas, 4-in. and larger, over ¾-in. thick	4 5 to 4 6	0.91 to 0.92
Angles, Thomas, 3-in.	4 12½ to 4 15	0.99 to 1.01
Hoop and strip steel over 6-in. base	3 15 to 3 17½	0.84 to 0.85
Wire, plain, No. 3 gage	9 12½	2.09
Wire, barbed, 4-pt. No. 12 B.W.G.	5 15	\$1.26 a keg
Wire nails, base		

The market here for Continental steel is stagnant.

Llanelly Steel Co., Ltd., is reopening its steel works and sheet mills on Dec. 29, after several months of idleness. Workman, Clark & Co., Ltd., has closed its Belfast shipyard for a period stated as not to exceed two months. The engine shops will reopen Jan. 19. This action has been forced by shipowners pressing for delayed deliveries of new vessels.

Steel Industries of Great Britain, Ltd., reports net profit for the period June 25, 1929, to Sept. 30, 1930, at £92,000 (\$448,000). Preferred dividends to June 30 absorb £87,000, leaving £5,000 (\$24,300) carried forward into surplus. The preferred dividend due Sept. 30 is being passed.

Unfavorable rumors are current regarding the Postmasburg manganese ore fields. First-grade ore reserves are stated to be inadequate and the Manganese Corporation (1929), Ltd., has entered into a 10-year contract with neighboring properties for supplies of manganese ore.

German Steel Industry Over-Expanded

Report of the German committee of inquiry states that the steel industry has been falsely led, and in many cases has been established on

false foundations, uneconomic, and remunerative only in conjunction with primary and accessory industries, and even then merely by exercising monopolistic power involving excessive costs to German consumers. The report says that rationalization has been carried out mainly by increasing the size of plants rather than by refashioning them, whereby owners have themselves rendered valueless their older works.

This capital loss, which would normally have resulted, but for amalgamations, in the collapse of individual firms, should not, the report avers, form part of production costs, but should come out of profits, the level of which is determined mainly by market price. Continuance of this false accounting means overburdening the steel works and the whole German economic structure. The report concludes that the iron and steel industry has become excessively large.

Luxemburg production in November included 178,000 metric tons of pig iron and 169,000 tons of raw steel. There were 26 blast furnaces active at the end of the month.

German pig iron output in November was 636,000 metric tons, and 64 blast furnaces were blowing at the end of the month.

Netherlands Offers Market For Road Machinery

WASHINGTON, Dec. 20.—Most of the road construction in the Netherlands is by contract, and the machinery used is nearly all owned by private corporations, says a report from Amsterdam to the Department of Commerce. The machinery required by the Government, the provinces and towns is usually for minor repairs. Among the important companies engaged in contracting on roads is one in Utrecht which has a number of branches. It has 70 road rollers of various types and builds its own machines of the lighter kinds. Otherwise, little road building equipment is manufactured in the Netherlands.

Asphalt spraying machines from England and asphalt-concrete mixing machines from Switzerland are used in considerable numbers, but the smaller implements used in road making are either imported from Germany or manufactured in the Netherlands. Foreign manufacturers either sell direct to the users or through agents who are on a commission basis. Dealers do not carry stocks as demand is insufficient and sources of supply are near. Representatives are necessary as the municipalities and provinces as well as the National Government usually award contracts for material and equipment in as short a

time as 10 days from the time of inquiry. The American exporter usually requires a credit in the United States, while European sellers extend credit, usually 30 days with a discount of 2 or 3 per cent for cash against shipping documents.

American Tool Builder Licenses German Plant

HAMBURG, GERMANY, Dec. 16.—License to manufacture under its patents has been granted by the National Acme Co., Cleveland (U. S. A.), to the Pittler Werkzeugmaschinenfabrik A. G. of Leipzig. The president of the National Acme Co., F. H. Chapin, has been elected to the board of directors of the Pittler company.

Czechoslovakia Reduces Tariff On Steel

HAMBURG, GERMANY, Dec. 16.—The Czechoslovakian Government has reduced import duties on steel products about 75 per cent in an effort to force the domestic steel industry to quote lower domestic prices. The Government's move has resulted in an average reduction by Czechoslovakian producers of steel of about 7s. (\$1.70) a ton.

Japanese Imports of Scrap Still Sizable

YOKOHAMA, JAPAN, Nov. 26.—Although Japan has drastically reduced imports of steel scrap from the United States, a fair tonnage is still being received by Japanese mills from Far Eastern sources. Total arrivals of scrap in October at Kobe, Osaka, Yokohama, Moji and Wakamatsu were 30,728 tons. The scrap came from China, Kwantung Province, India, Straits Settlements, the Dutch and French East Indies and the Philippine Islands. About 3800 tons came from Canada, Belgium and England.

Tata Works to Build New Blast Furnaces

HAMBURG, GERMANY, Dec. 16.—The Tata Iron & Steel Co., at Jamshedpur, India, will shortly begin erection of two blast furnaces of 1600 tons daily capacity each to replace three old furnaces being dismantled. Most of the materials for the new furnaces are being furnished by Escher Wyss & Co., Zurich, Switzerland, but German and American companies are also interested. The new furnaces will increase the tonnage of foundry iron available for export.

French Mills Increase High-Grade Steel Output

WASHINGTON, Dec. 16.—Steel mills in the east of France are making a determined effort to produce more special steels, according to a report from Paris to the Department of Commerce. The majority have installed open-hearth and the latest electric furnaces. Four large companies have recently formed subsidiaries which will specialize in electric steel. These are the Société Lorraine Minière et Metallurgique, the U. C. P. M. I., Nord et Lorraine and the Société d'Electro-Chimie d'Ugine.

Japanese Inquire For Long-Life Rails

YOKOHAMA, JAPAN, Nov. 26.—The municipal electric bureau of Osaka is seeking quotations on special high-grade steel rails for extensions to the city tramway. As the streets through which the extensions are to be laid are narrow, replacement will be expensive and the intention is to buy rails that will have long life. Types B and PS of the American Railway Association specifications are being considered and a patented German rail is being tested. Another unusual specification for Japan in this inquiry is a minimum length of 14 meters (46 ft.).

Foreign Capital In Poland

HAMBURG, GERMANY, Dec. 16.—About 14 per cent of the total capital invested in the Polish steel and machinery industries is American, 11 per cent German, 3 per cent British, and 2 per cent from other foreign sources.

Standard Process of Hardening Screws

(Concluded from page 1924)

furnaces and is drawn up and out by means of the fan. These systems are so effective that work can go into the furnaces containing water and oil with the assurance that the resulting dense steam and yellow smoke emitted will be immediately passed out and the air kept clear when all the furnaces are working under the worst possible conditions. By means of these systems the air in the room can be replaced in 5 min.

The work is handled by a $\frac{1}{2}$ -ton electric hoist and two $\frac{1}{4}$ -ton hand hoists, one of the hand hoists serving the Homo furnace and the other being reserved for emergencies. To avoid the physical strain of loading the furnaces by hand, the method ordinarily used, a scoop large enough to carry the charge of 350 lb. for the large furnaces has been provided. This scoop is handled by the electric hoist, as illustrated.

After the work is heat-treated, it is tested for hardness in a Rockwell hardness-testing machine, for strength in a special machine that gives readings in pounds on a leverage of 1 in., and against brittleness by hand in a special fixture. If any deviation from standard is noted, or if any decarburization is discovered, the lot is rehardened or each piece is inspected.

The department maintains a daily record of gas consumption, recording the number of cubic feet of gas used per pound of work. Each lot is recorded with its hardness reading.

Cores Baked in Continuous Gas-Fired Ovens

(Concluded from page 1921)

In the case of the continuous oven we have to consider the cost of gas and air and the labor of getting the cores into and out of the oven. The results showed a cost of 56c. per ton, or 28c. per 1000 lb. of sand dried.

Following this test, certain changes were made which have still further reduced the cost of drying in the continuous oven.

Fig. 8 shows some interesting curves. The curves were obtained by passing two thermocouples through the oven, one being attached to each end of one of the drying racks. These thermocouples were arranged with long follow wires, which were fed through the oven as the racks progressed. These curves show the drying temperature at various parts of the cycle during the passage of one rack through the oven. On the diagram is also shown the desired or ideal temperature requirements, and the results show how near it was possible to achieve the ideal.

In Fig. 9 is shown the curves for an entire day's run of the four control instruments.

Two other interesting curves are shown in Fig. 10. In the upper the gas consumption is shown with the pilot lights allowed to burn for the entire 24 hr. In the lower diagram the pilot lights were turned out at night with a decided saving in gas.

At first it was proposed to run out all cores made in a given day at night and to start with an empty oven in the morning. As practice developed, it was

found possible to stop the progress of the carriages in the oven as soon as the core makers stopped, and also to stop the carriages during the noon-hour and to turn off the gas during the noon-hour. With this arrangement all cores come through properly baked, and the working schedule of all the employees about the room is greatly simplified.

In one of the tests it was found that the core making schedule was such that the oven was only about 75 per cent loaded. To overcome this, provision was made for bringing cores from certain other benches and feeding them into the oven so as to give a maximum load. This arrangement resulted in a decided saving in gas consumption per amount of sand dried and also a greater efficiency in the performance of the help employed about the oven.

The results of these studies indicate that where a sufficient volume of cores are required to warrant it a continuous oven will justify the use of more expensive fuel and still show a good saving in the overall performance of the equipment.

Pipe Mills Install New Management Program

(Concluded from page 1907)

were set as in the butt welding department. The manner of arriving at the foreman's performance and bonus was identical with that illustrated.

The method of obtaining costs per sizes per 100 ft. of pipe for the other productive departments is also the same as that used in the illustration. In the finishing departments standards for the various kinds of pipe were set which permitted the cost for those kinds of pipe to be obtained. Included therein were regular threaded and coupled pipe, plain ends, beveled edge, casings, special orders cut to dead lengths, etc. The total manufacturing cost will be in terms of 100 ft. per size, and will show the individual cost of every step in the processing on the same basis. Many unusual and interesting facts were brought to light in the preparation of the costs.

In concluding, the writer wishes briefly to review what each of the various steps in this installation helped to do for Page Hersey Tubes, Ltd.

First, the survey indicated that extensive reductions in manufacturing costs were possible and where such reductions could be made throughout the organization.

Second, the application of the wage incentive plan for the workers, based upon a fair day's pay for a fair day's work, resulted in the immediate increase of production by most of the operators in the plant. The bonuses established permitted better earnings for this increased production than was enjoyed under the old piece-work plan.

Third, the plan placed the foremen upon the performance bonus and brought to light those who were really executives and knew how to handle men. The foremen realized that their showing depended entirely upon their own efforts, and they met the situation in a praiseworthy fashion. The number of so-called delays and normal production interruptions that were eliminated was astonishing. All of the foremen, after they were placed on bonus, im-

Business as Others See It

Digest of Current Financial and
Economic Opinion

IN a great crisis of 1914 Marshal Foch reported that his right was being driven back, his left was outflanked and his center was crumbling, but he had decided to order an advance all along the line. That looks like the situation in business today. Evidences of lower and lower activity bring the observation that, at such levels, "it has in the past not stayed very long."

As Brookmire Economic Service puts it, "the nearer prospect is for the beginning of a moderate and irregular advance running into 1932." But that service anticipates that "the next four or five years, at least, will be relatively quiet."

Will Take Time to Reach Normal

Equally guarded is the view of Harvard Economic Society: "Our expectation is that general business activity will cease to decline probably during the first quarter of 1931, and show gradual revival during the rest of the year."

After analyzing numerous activities in the light of past depressions, that society reports that "a general tendency has appeared for security prices to move [up] first

and for particular business activities—construction, import trade, manufacture—to give early evidence of an upturn. . . . At a time like the present it is worth while to watch . . . also the movement of general business volumes, as recorded by check transactions."

Substantially the same prospect for the next quarter is seen by Poor's, which thinks that "1931 should be a year of gradual recovery in industry and commerce, but with the early months possibly getting away to a delayed or slow start. The first quarter should be much better than the last quarter of 1930. . . . Underlying conditions have been strengthened by liquidation since the middle of 1929."

Regard Thorough Housecleaning as Salutory

Two authorities note the "thorough housecleaning" which has been undergone by industry. Alexander Hamilton Institute cites this as reason for not entirely regretting the slowness of business recovery to manifest itself. And *Annalist* regards it as "constituting one of the best signs of the times."

That last-named observer looks for recovery within "one or two months," basing this expectation on the present low level of its index of business activity and past history under such conditions. To reach "normal," however, will take some time. Similar situations in the last half-century have seen normal recovered in from 13 to 19 months after the start was made.

Abnormal Conditions Always Impermanent

That "business is beginning to pull itself together" is another observation. And Theodore H. Price, in *Commerce and Finance*, writes of "the impermanence of the abnormal. . . . Both panics and wars are abnormal conditions, and we again call attention to their impermanence. . . . To those who have been able to maintain a detached position the ending of the present depression seems to be very close at hand. . . ."

"Taking it all in all, the situation does not seem to justify the pessimism that is so widespread. While it may be necessary for the disease to run its course, we may be nearer the end of hard times than many seem willing to admit."

mediately began to figure where they might reduce their gang, by grouping work, speeding up operations or eliminating certain jobs. The reason for this was quite evident — less man-hours meant greater bonus. A very decided cut in man-power was made by all the foremen in their respective departments.

Fourth, the elimination of the old tonnage method of arriving at costs, by the introduction of the cost per size per 100 ft. basis, permitted Page Hersey to enjoy an advantage that none of its competitors had. It enabled the company to quote prices and feel secure that such quotations not only fully covered the costs, but provided for a good margin of profit, too. The company knew that in the main those quotations would get the business, because each item on that order was priced according to the actual cost as established by the method described above.

Cutting Tools Manufactured in Specially Designed Plant

(Concluded from page 1911)

The interior of the shop is painted mill-white, with two coats of lead and oil. It is estimated that this doubles the effective daylight and is a good investment. The paint can be washed and the dirt removed.

The office portion of the building covers 40 x 190 ft., is two stories in height, and is set back 20 ft. from the sidewalk. It is of modernistic design, with brick and stone as facing materials. Strong pilasters accentuate the vertical lines of the building and at each end heavy pylons are features. The main entrance is attractive and forms the central motif for the design.

Except for the entrance, the first floor of the office structure forms part of the shop, the upper floor being used for executive, administrative and general offices. On both floors architectural projected sash has been used for windows. If enlargement of the office portion of the plant becomes necessary, the ground floor under the office can be readily finished for this purpose. Manufacturers regularly plan production expansion, but neglect to provide future office facilities. In the Michigan Tool Company's case, this was accomplished at an additional cost of less than 1 per cent.

Founded in September, 1915, the company has outgrown two homes in its 15 years' history. The new plant, designed and built by the Austin Co., Cleveland, contains 60,000 sq. ft. of manufacturing area, gives 50 per cent additional capacity and increases the number of employees to 800. D. R. Peterson is president, Otto Lundell vice-president and general manager, and O. L. Bard secretary.

